CYMTCC 5.0
Reference Manual and
User Guide

July 2009

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CYME International T&D Inc.
1485 Roberval, Suite 104
St. Bruno QC J3V 3P8
Canada

Tel.: (450) 461-3655
Fax: (450) 461-0966
Canada & United States: Tel.:1-800-361-3627

Internet : http://www.cyme.com
E-mail: support@cyme.com

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Chapter 1 Getting Started

1.1 Overview of CYMTCC

CYMTCC addresses coordination of protective devices in industrial, commercial and distribution power systems.

- Use it to produce **Time-current curve plots and device setting reports** using any of the 15000 devices stored in the library.
- If necessary, you can **add new devices** to the library, and edit the curves and setting ranges of the existing devices.
- **Plot curves** on standard Keuffel & Esser log-log forms, or on plain paper. Export the one-line diagrams or the time-current curve plots to files for inclusion in reports.

CYMTCC provides a **CAD-like editor** for the one-line diagrams. Click-and-drag device symbols from a menu onto the drawing surface ("canvas"), where you can move, rotate and connect the symbols. You can also draw parallel circuits.

- Examine and change the settings of any device at any time.
- Measure **coordination margins** on-screen using the mouse or the **Device Margin** function.
- Ask CYMTCC to **verify coordination automatically**, according to your criteria.

You have control over details such as current scale, plotting voltage, title block, curve colors, line thickness and device identification.

- Customize the curve **identification tags** and move them around on the plot.
- Insert **special details** such as company logos, title blocks and floating text balloons to enhance your drawings.

The **Coordination Wizard** proposes settings for one or many protective devices of a given circuit. The proposed settings ensure that the protective devices are coordinated, i.e. that the device nearest to the fault will operate before its upstream device can function.

1.2 Computer System Requirements

CYMTCC for Windows requires an IBM PC or compatible computer using Microsoft Windows 2000/XP/VISTA or later.

The **minimum** hardware requirements are:

- An Intel Pentium or compatible processor.
- 512 MB of random access memory (RAM).
- 250 MB of hard disk space for the full version of CYMTCC.
- Mouse or other pointing device.
- Any printer or plotter supported by Windows.
- Screen resolution of 1024*768.

1.3 Running CYMTCC for Windows

If you have a shortcut icon on your Windows desktop, double-click on it.

Otherwise, CYMTCC is installed under **Start > Programs > CYME > CYMTCC 5**. Click on the CYMTCC icon.

The usual procedure for performing a coordination study is to activate **CYMTCC**, open a new or existing study, and then either insert more devices (**Create**) or modify existing ones. You may open more than one study at a time. You may make copies of a study (**File > Save As**), and you may copy a device from one study to another (**Edit > Copy**).

Make use of the **Fast Adjust (Drag)** mode to adjust the settings of devices by clicking and dragging the curves rather than editing them through the dialog boxes every time.

Use the options under the **Analysis menu** when you want to check coordination margins or request a coordination verification according to your own criteria.

When your work is done, save it via **File > Save**. Print it out via the **File > Print** command. View the device settings report via **Tools > View Summary Report**. Choose **File > Exit** to leave CYMTCC.

1.4 File Extensions

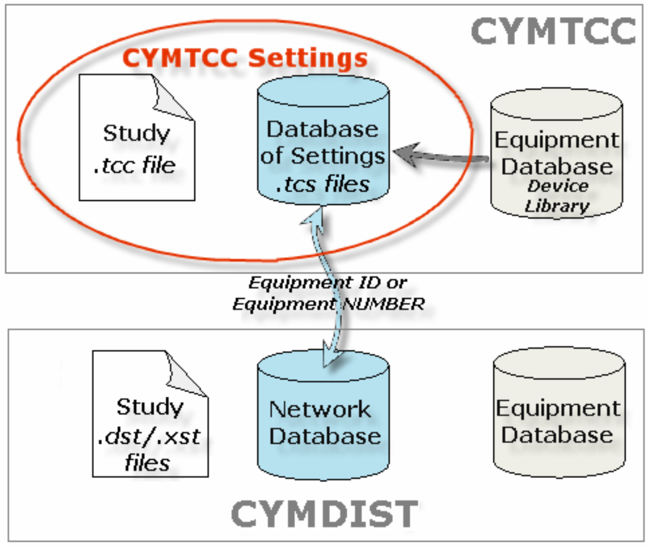
The standard file extension for a CYMTCC study is "**.TCC**".

The .DAT extension identifies CYMTCC 3.x files – Users of CYMTCC 3.x can read their studies ("DAT" files) but if they save them, the files will be saved as "TCC files". Users of the old CYMCOORD (DOS) program need to read and save their studies with CYMTCC 3.x before adopting CYMTCC 5.

The .**ETU** extension identifies a study that had been created with the French version of the CYMTCC application, version 3.x. When a study with that extension is opened with an English version of CYMTCC, the data is displayed in English.

Every time you open a study file (.TCC) a **.BAK** file with the same name is created in the same directory than its related .TCC file. So, if you need to go back to the same state the study was before you made your modifications, just rename the .BAK file to .TCC. Please note that if you reopen the study file (.TCC), you will not be able to go back to the previous state of the study. Remember that the .BAK file is created when the .TCC is open.

The settings to protective equipment are stored as separate database files called *Time Current Settings* files **(.TCS)** in a database called the Database of Settings. This database is shared by CYMTCC and CYMDIST or PSAF. This database is sometimes called "Project Database". Like a CYMTCC study, it will keep a link of the protective devices you entered in CYMDIST (or PSAF). It will also keep other information such as location and short-circuit values. You can define as many Databases of Settings as you want in CYMTCC. You can easily add a new Database of Settings from the CYMTCC using the Settings Tab of the Multi-Explorer (see 16.3).



The CYMTCC**.INI** file comprises the various default parameters such as for visualization, precision, default information, etc. These defaults can be edited through various functions in CYMTCC.

The equipment database, CYMTCC**.MDB** by default, contains all the time/current data points and other information related to each curve. (See Chapter 13 The Database Menu for more information.)

The files with the extension **.TCCWS** contain the information related to the workspace.

For more information see the Workspace Tab section 16.2.

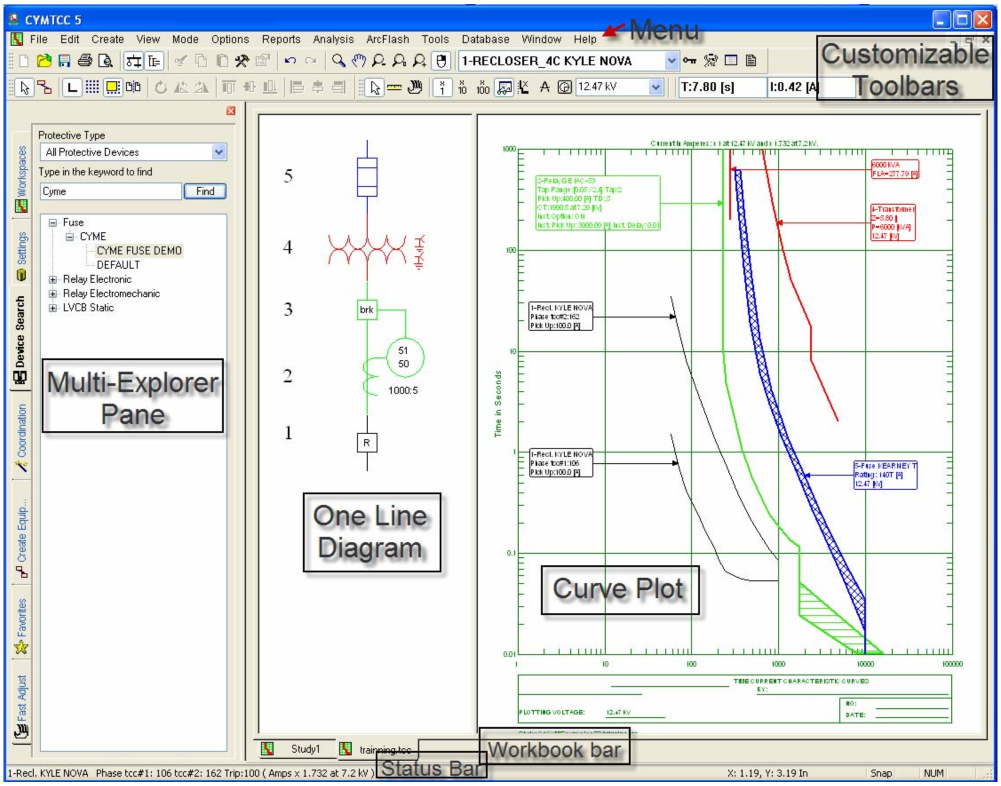
1.5 CYMTCC Graphic User Interface

The CYMTCC interface is basically composed of elements that will allow you accessing and displaying the data you want to work on, and using all the CYMTCC commands.

When you open a study, the **Curve Plot** is shown in one window, and the associated **One-line Diagram** is displayed in another. Along the top of the screen is the **Main Menu** that provides all of the CYMTCC commands in pull-down menus. Immediately below that are the **Toolbars**, where icons provide instant access to frequently used menu commands. The various Toolbars are explained in the Quick Reference (Section 1.6).

The **Multi-Explorer** pane appears to the left of the CYMTCC display. With it, you can access to the settings files (Settings Database), search devices, access the coordination options, access the create equipment option, and set-up a list of the devices you most often use.

You will notice **Tabs** located at the bottom of the graphic displays. This the Workbook bar where all the study files currently opened are listed. The study names are indicated on the tabs.



The **Status Bar** is located at the bottom of the window. The information that is displayed there depends on what you are doing. If you go to an option in the menu, for example, you will see in the Status Bar a description of the command that is selected. When you select a device, the Status Bar displays a description of that device.

More explanation about the Curve Plot and The One-Line Diagram workspaces and about The Multi-Explorer pane are presented in Chapter 2 and Chapter 16 of this manual.

1.6 Quick Reference

1.6.1 CYMTCC Menus

The **MAIN MENU** at the top of the CYMTCC screen gives access to all CYMTCC commands. The menu commands are enabled or disabled depending on whether there is an open study or not.

Each menu item contains sub menu options. To display the sub menu click on the word in the menu with the left mouse button. Some sub-menu commands can be accessed by holding down the ALT key and the key corresponding to the letter underlined in the sub-menu item. You can assign or modify keyboard **Customize Shortcuts** to any of the menu commands. More about this can be found in section 6.2.

1.6.2 CYMTCC Toolbars

The Toolbars contain icons, which give quick access to many menu commands.

When you install CYMTCC without selecting the option of customizing the Toolbars, four will be installed by default:

- Main Toolbar that includes icons for general commands such as file management, print, cut & paste, reports, zoom, pan, etc.
- Plot Toolbar that includes commands used for the curve plots.
- Diagram Toolbar that includes the most commonly used commands for the creation and editing of the one-line diagrams.
- Analysis Toolbar that includes icons for accessing the dialog boxes used in defining the criteria of the analyses to run.

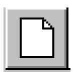
CYMTCC comprises other Toolbars for more sophisticated diagram editing. To display those, customize your own, or hide a displayed toolbar, choose **View > Customize > Customize Toolbars** in the menu. (See section 6.3).

The additional toolbars are:

- Drawing Toolbar
- Alignment Toolbar
- Rotate Toolbar
- Canvas Toolbar
- Layout Toolbar
- Special Details Toolbar
- Arc Flash Dist. Toolbar
- Arc Flash Indu. Toolbar
- Database Toolbar
- Zoom/Pan Toolbar

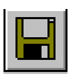
Hint:	You may rearrange the icons in the Toolbars. Press the “ALT” key and click and drag the icon to a new location. See also Section 6.3 **Customize Toolbars**. You may also move the Toolbars anywhere on the CYMTCC window.

1.6.3 Main Toolbar



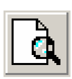
OPEN NEW STUDY. Opens a new study with the temporary name "Study1". Same as **File > New**. (Section 3.2)

OPEN STUDY. Displays a list of available studies. Double-click on the one you want to open. If the screen already displays a study, new windows will open for the second study. Same as **File > Open**. (Section 3.3)

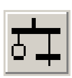


SAVE STUDY. Updates the existing disk file or, if the study is a new one, creates a file with the name you specify. Same as **File > Save**. (Section 3.5).

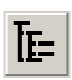
PRINT WINDOW. Opens the Direct Print Dialog Box allowing you to print the Plot and/or Onle line diagram. **File > Print...**. (see 3.13 Print Diagram).



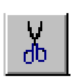
PRINT PREVIEW. A view that shows how the One-Line Diagram or the Plot will look like when you print them.



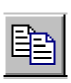
OLD. Shows or hides the One-Line Diagram window.



MULTI-EXPLORER. Shows or hides the Multi-Explorer pane.



CUT. Removes the selected device and stores it in the CYMTCC clipboard. Same as **Edit > Cut** (Section 4.4) or the **Shift-Delete** key combination.



COPY. Stores a copy of the selected device in the CYMTCC clipboard. Same as **Edit > Copy** (Section 4.5) or the **Ctrl-Insert** key combination.

PASTE. Inserts a copy of the device in the CYMTCC clipboard into the one-line diagram, immediately upstream from the selected device.

Same as **Edit > Paste** (Section 4.6) or the **Shift-Insert** key combination.

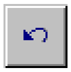
MODIFY. Displays the **Settings** dialog box of the selected device.

Same as **Edit > Device Properties** (Section 4.9) or the **Shift-M** key combination.

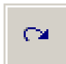
Same as double-clicking anywhere in the plot or the one-line windows.

Note:	CUT, COPY, PASTE and MODIFY require that you first select a device. (See Section 1.7.1 Device Selection)

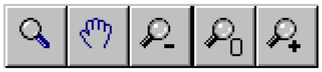
PROPERTIES. Displays the **Properties** dialog box of the selected component. Same as **Edit > Symbol Properties** (See 4.10).



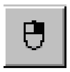
UNDO. Cancels the last modification(s). Same as **Edit > Undo**.



REDO. Repeats the last undone modification. Same as **Edit > Redo**.

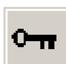


ZOOM / PAN. See **Pan and Zoom** (See 1.7.2 Pan and Zoom).



RIGHT BUTTON MODE. See **Pan and Zoom** (See 1.7.2 Pan and Zoom).

DEVICE LIST. Displays the selected device and allows selecting another device from the list of the devices in the active study.



HIDE. Click here to hide the curve of the selected device. The device symbol remains in the one-line diagram. Useful if the curve plot is crowded. This button is highlighted when you hide a device curve, and each time you select a device which curve has been hidden.

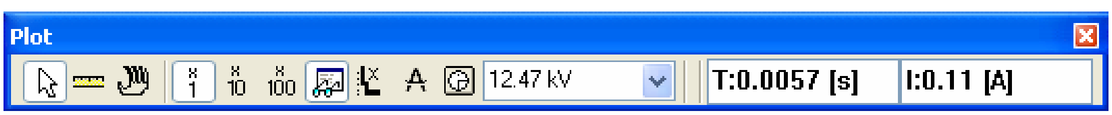
Same as the **Shift-H** key combination. Same as **Edit > Hidden** (Section 4.11)

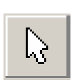
MULTI-HIDE. Opens the **Multi-Hide** dialog box. Lets you select the device curve(s) you would like to hide. The **Protection** column indicates if the device is used for phase or for ground protection if possible.

XML REPORT. Displays the dialog box where you can select the reports you would like to see. Same as **Tools > Summary (Tabular)** (Section 9.3)

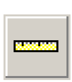
Displays the Detailed Report. (See 9.4 Detail (Tabular))

1.6.4 Plot Toolbar



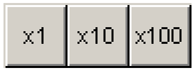


TRACK MODE. Puts the mouse pointer in Tracking mode. Displays the coordinates of the cursor position in the curve plot. Same as **Mode** > **Track.** (Section 7.2).

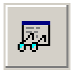


RULER MODE. Calculates the distance (current and time) between any two points selected on the grid, and displays the results in the status bar. Same as **Mode > Ruler**. (Section 7.3).

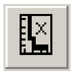
FAST ADJUST MODE (Drag Mode). To change the settings of a device by dragging its curve with the mouse. The Fast Adjust dialog box is available in the Multi-Explorer (see Chapter 16.8.)



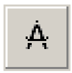
CURRENT SCALE. Multiplies the current scale by the chosen factor. See **View > Plot** (Section 6.11)



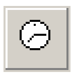
PAGE LAYOUT. Shows the Curve Plot as it would appear if printed. See **View > Plot** (Section 6.11)



GRID OPTIONS. See **View > Plot** (Section 6.11)

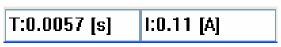


DEVICE MARGIN. Detects curve intersections and measures time and current margins between curves.



SECONDS / CYCLES. Displays time in cycles instead of seconds in the status bar. See **View > Plot** (Section 6.11)

PLOTTING VOLTAGE. Selected voltage at which all time-current curves are plotted as if the devices were all in service at this voltage, to make it easy to compare the curves. See **Options > Title Block Information** (Section 8.15)

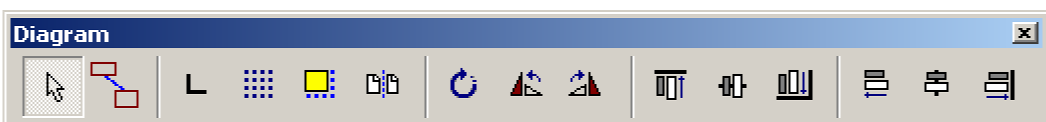


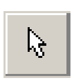
Displays the **Time** (T:) and the **Current** (I:) mouse position in the plot. When in **Ruler** mode, the Delta values are displayed.

Note: The same information is displayed in the status bar.

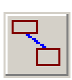
1.6.5 Diagram Toolbar

The **Diagram Toolbar** comprises the main editing tools used for the creation and editing of the one-line diagrams. Please refer to Sections 1.6.7 through 1.6.11 for information on the additional drawing Toolbars.

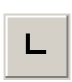




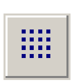
SELECT MODE. Normal selection mode. Changes the mouse pointer to an arrow to select one device at a time on the drawing.



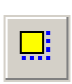
CONNECT MODE. Links and snaps a new symbol to an existing one.



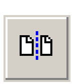
ORTHO. Links symbols with orthogonal vectors.



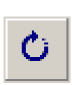
GRID. Displays or hides the grid in the one-line diagram window.



SNAP TO GRID. Snaps symbols to the drawing grid.



PAGE BOUNDS. Displays the borders of the individual sheets on the canvas.



FREE ROTATE. Allows rotating a component to any angle.

ROTATE LEFT. ROTATE RIGHT. Rotates the selected symbol ninety degrees to the left or to the right, respectively.

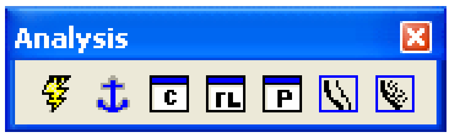
ALIGN TOP. ALIGN BOTTOM. Lines up multiple components to their top or their bottom edge, respectively.

ALIGN MIDDLE. Centers multiple components horizontally.

ALIGN LEFT. ALIGN RIGHT. Lines up multiple components to their left or their right edge, respectively.

ALIGN CENTER. Centers multiple components vertically.

1.6.6 Analysis Toolbar



RUN ANALYSIS. Verifies coordination, minimum clearing time and device loading level for all the devices of the current study. Same as **Analysis** > **Protective Device Analysis**. (section 10.1)

MARGIN ANCHOR. Displays the **Margin Anchor** dialog box, from which you can set a line between two curves to calculate the gap between them. **Analysis** > **Margin Anchor**. (section 10.3)

COORDINATION CRITERIA. Displays the **Device Coordination Criteria** dialog box, from which you may choose the criteria to verify coordination between devices. Same as **Analysis > Coordination Criteria**. (section 10.4)

REACH AND LOAD CRITERIA. Displays the **Protective Reach & Device Loading Criteria** dialog box, from which you may choose the criteria to verify the clearing and loading of devices. Same as **Analysis** > **Reach and Load Criteria**. (section 10.5)

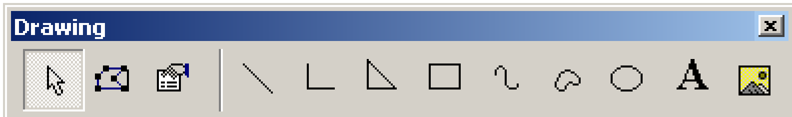
PROTECTION CRITERIA. Displays the **Device Protection Criteria** dialog box, from which you may choose the criteria to verify the protection of transformers, cables and motors. Same as **Analysis** > **Protection Criteria**. (section 10.6)

DISPLAY/HIDE CURVE. To display or hide the coordination curves on the plot view. Same as **Analysis** > **Show Coordination Curves Based on Criteria** > **Display Curve** (section 10.7)

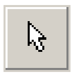
DISPLAY/HIDE HATCHING. To display or hide hatching between the device curve and the corresponding coordination curve. Same as **Analysis** > **Show Coordination Curves Based on Criteria** > **Display Hatching** (see section 10.7)

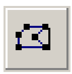
1.6.7 Drawing Toolbar

Note: For the one-line diagram only.

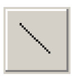


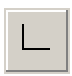
Section 2.4 Drawing Capabilities, provides details as to how to use these tools.

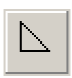

SELECT. Normal selection mode. Changes the mouse pointer to an arrow to select one device at a time on the drawing.

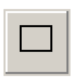

EDIT POINTS. Displays the vertices of a selected component so you can change the shape of that component.

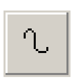

PROPERTIES. Displays the **Component Properties** dialog box for the selected symbol. (see section 4.10 Symbol Properties)

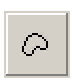

LINE. To draw a straight line.

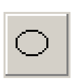

POLYLINE. To draw a line with multiple angles.

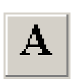

POLYGON. To draw a closed figure with three or more straight lines.


RECTANGLE. To draw a rectangle or a square.


POLYCURVE. To draw a line that curves smoothly at the inserted vertices.


CLOSED CURVE. To draw a closed figure with two or more curves.


ELLIPSE. To draw an ellipse or a circle.


TEXT. To add new text or to edit existing text.

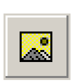
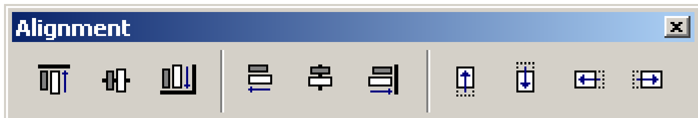
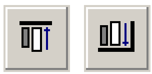


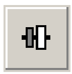
IMAGE. To insert an existing .bmp or .dib image.

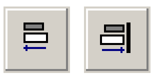
1.6.8 Alignment Toolbar

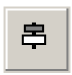
Note: For the one-line diagram only.

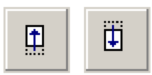


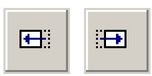

ALIGN TOP. ALIGN BOTTOM. Lines up multiple components to their top or their bottom edge, respectively.


ALIGN MIDDLE. Centers multiple components horizontally.


ALIGN LEFT. ALIGN RIGHT. Lines up multiple components to their left or their right edge, respectively.

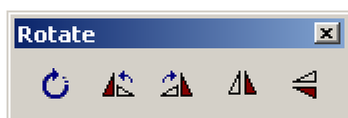

ALIGN CENTER. Centers multiple components vertically.

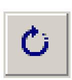

NUDGE UP. NUDGE DOWN. Moves the selected component by one unit. With the SHIFT key pressed, moves by five units.

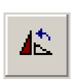

NUDGE LEFT. NUDGE RIGHT. Moves the selected component by one unit. With the SHIFT key pressed, moves by five units.

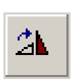
1.6.9 Rotate Toolbar

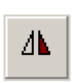
Note: For the one-line diagram only.




FREE ROTATE. Allows rotating a component to any angle.


ROTATE LEFT. Rotates the selected symbol ninety degrees to the left.

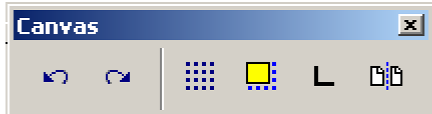

ROTATE RIGHT. Rotates the selected symbol ninety degrees to the right.

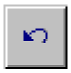

FLIP HORIZONTAL. Flips the selected component horizontally.

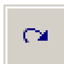

FLIP VERTICAL. Flips the selected component vertically.

1.6.10 Canvas Toolbar

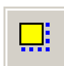
Note: For the one-line diagram only.



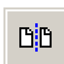

UNDO. Cancels the last modification(s). Same as **Edit > Undo** (Section 4.2).


REDO. Repeats the last undone modification. Same as **Edit > Redo** (Section 4.3)


GRID. Displays or hides the grid in the one-line diagram window. Same as **View** > **One Line Diagram** > **Grid** (section 6.10).

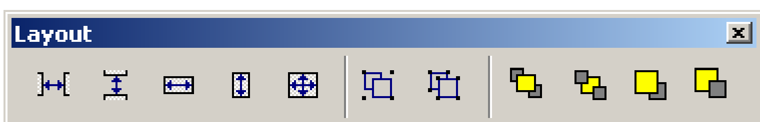

SNAP TO GRID. Snaps symbols to the drawing grid. Same as **View** > **One Line Diagram** > **Snap to Grid** (section 6.10).

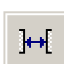

ORTHO. Links symbols with orthogonal vectors.

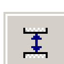

PAGE BOUNDS. Displays the borders of the individual sheets on the canvas. Same as **View** > **One Line Diagram** > **Page Bounds** (section 6.10).

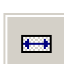
1.6.11 Layout Toolbar

Note: For the one-line diagram only.



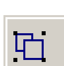

SPACE ACROSS. Evens the horizontal spaces between selected components.

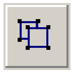

SPACE DOWN. Evens the vertical spaces between selected components.

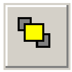

SAME WIDTH. Resizes the width of the symbols of selected components to the same width than the first symbol selected.

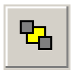

SAME HEIGHT. Resizes the height of the symbols of selected components to the same height than the first symbol selected.

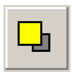

SAME SIZE. Resizes the symbols of selected components to the same size than the first symbol selected.

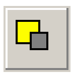

GROUP. Congregates two or more selected components into a single object.


UNGROUP. Splits up the grouped components into individual components.


BRING TO FRONT.


SEND TO BACK.

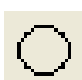

BRING FORWARD.

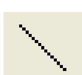

SEND TO BACK.

1.6.12 Special Details Toolbar

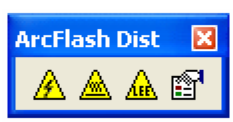
Note: For the time/current plot window only.

ADD TEXT. To add a text label. Click on the icon and click on the plot to specify the location where you want to position the label. A **Text Label** dialog box will be displayed so you can enter your details.

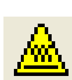

ADD CIRCLE. To add a circle on the plot. Click on the icon and click on the plot to specify the location where it will be displayed.


ADD LINE. To add a line on the plot. Click on the **Line** button, and click on the plot with the left mouse button. The first click will indicate the X1,Y1 location. Hold down the mouse button, the mouse cursor will change to “Line”. Move the cursor to the desired X2,Y2 location and release the mouse button.

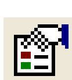
1.6.13 Arc Flash Dist. Toolbar



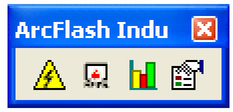

Displays the **NESC 2007** report. (See 11.1.1)


Displays the **Heat Transfer Model** report. (See 11.1.2)

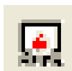

Displays the **Lee Method** report. (See 11.1.3 IEEE 1584-2002 Lee Method)

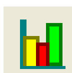

Opens the **Arc Flash Parameters** dialog box. (See 11.3)

1.6.14 Arc Flash Indu. Toolbar



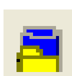
 Displays the **IEEE 1584** report. (See section 11.2 Industrial Analysis)

 Displays the **NFPA** report. (See 11.2 Industrial Analysis)

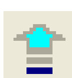
 Opens CYMVIEW. (See 11.2.5 View Existing Chart Report (CYMVIEW))

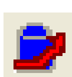
 Opens the **Arc Flash Parameters** dialog box. (See 11.3)

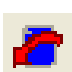
1.6.15 Database Toolbar

 Opens the **Change Library** Database dialog box. Use it to set the path of your library MDB file. (See 13.2)

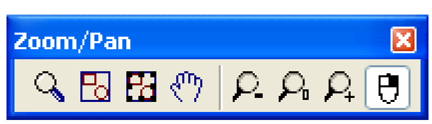
 Opens the **Library Editor** dialog box. (See 13.3)

 Opens the **Library On-line Update** dialog box. Use it to get the new curves available on our website. (See 13.4)

 Opens the Database Export dialog box. (See 13.5.2 Export)

 Opens the Database Import dialog box. (See 13.5.6 Import)

1.6.16 Zoom/Pan Toolbar



See 1.7.2 Pan and Zoom, for all the details.

1.7 Mouse Commands

1.7.1 Device Selection

You will need to “select” devices to perform a number of actions.

There are four ways to select a device:

1. In the One-line Diagram workspace: Left-click once on the symbol.
2. In the Curve Plot workspace: With the cursor in Track Mode (see Section 7.2), left-click once on the curve or the tag of the device.
3. In the Multi-Explorer pane, click on the Coordination Tab to see the list of devices, left-click once on the name of the device.
4. On the Main Toolbar Device combo box: Click on the (↓) symbol to display the device list. Then click on the device name in the list to select it.

When a device is selected:

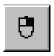
- its set-up data is displayed in the Status Bar, at the bottom of the CYMTCC application window.
- its symbol is highlighted on the one-line diagram (when displayed).
- its name appears in the **Device** list box in the Main Toolbar.

You can select more than one device on your one-line diagram. In the One-Line Diagram workspace, left-click once on a symbol. To select the next devices, press the SHIFT key and left-click once on the other symbols wanted while keeping the SHIFT key down.

1.7.2 Pan and Zoom

There are two ways to pan:

1. Click once in the workspace (one-line or plot) to activate it. Click the **Pan** button  in the Main Toolbar or in the Zoom/Pan Toolbar. Click the left mouse button once anywhere in the One Line Diagram workspace or the Plot workspace and hold the button down. Move the mouse to reposition the cursor and release the button of the mouse.
2. Click the right button hold it down and drag the mouse. Release the button.

Note:	For the One Line Diagram, you have to click the RIGHT BUTTON MODE icon  in the Main Toolbar or in the Zoom/Pan Toolbar in order to use the right mouse button.

The drawing will move the same distance in the same direction, as though you had pulled it with the mouse.

You can zoom in your one-line diagram or your plot curves to get a close-up view of a selected area. There are two ways to do this:

1. Click once on the **Zoom** icon in the Main Toolbar. Then click the left button of the mouse pointing to a corner of the area you wish to zoom in. Keep the mouse button down and drag a rectangle over the area to zoom. Release the mouse button.
2. Point in the drawing to a corner of the area you wish to zoom in and <u>press twice</u> on the right button of the mouse. On the second click, hold the button down and drag a rectangle over the area to zoom. Release the mouse button.

<u>Note</u>:	For the One Line Diagram, you have to click the RIGHT BUTTON MODE icon in order to use the right mouse button.

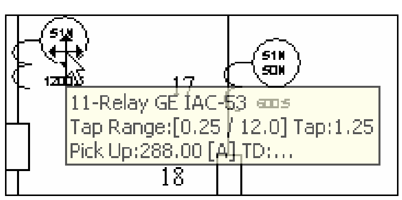
You can zoom in and out by increments. First, click once anywhere on the workspace (one-line or plot) you wish to zoom, to activate it. Click on the **Zoom In** or **Zoom Out** buttons in the Main Toolbar or in the Zoom/Pan Toolbar. Each time you will click on these buttons, your drawing will zoom in or out, by increments. It will work the same way whether you are in Right Button Mode or not.

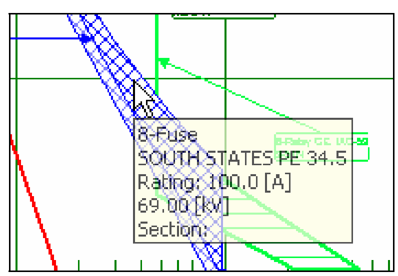
Finally, you can zoom in your workspace to the size of your drawing. Click once on the workspace you wish to zoom. Click on the **Zoom To Fit** button once . The drawing will be fit to the size of your workspace. It will work the same way whether you are in Right Button Mode or not.

<u>Note</u>:	For the one line diagram, when the “Right-Button” icon is active, you have the ability to Pan and Zoom at all times, but you sacrifice access to the menus you otherwise obtain when you right-click.

1.7.3 <u>Information Tags</u>

When you move your mouse over the symbols on the one-line diagram or the curves in the plot, information tags will be displayed for each equipment. This will help you identify more easily the equipment in your drawings.

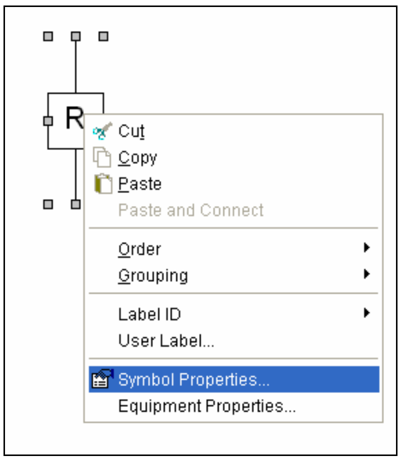


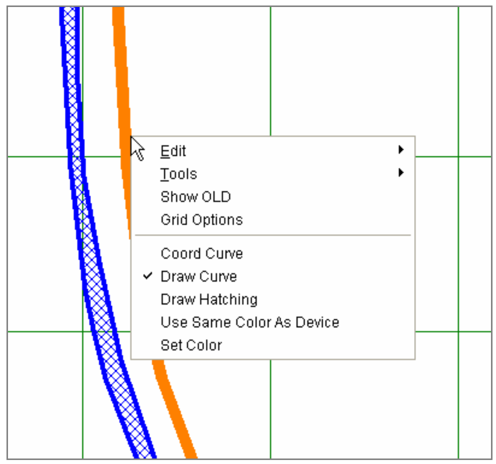


1.7.4 Contextual Menus

You have access to a Contextual Menu when you right-click on symbols in the **One-Line Diagram** display, or in the background One-Line Diagram window.

In the **Plot** window, several different contextual menus will be display. If the click was done on a tag, a curve, a graphic or in the background, the menu list will be different. Also, depending on the type of curve you have clicked on, the menu will display options related to this curve type.





Notes:	When the "Right-Button" icon is active, you cannot access to the contextual menus, in the one line diagram, by right-clicking on the symbols. If you put your mouse cursor on a curve, a tooltip will appear showing the curve name and its curve type.

1.7.5 Other Mouse Commands

You will use your mouse for other types of actions in CYMTCC. See the following Sections for all details:

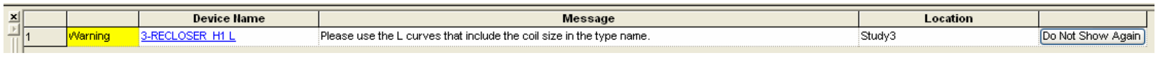
- Inserting and Connecting Symbols (section 2.2)
- Manipulating Components (section 2.3)

1.7.6 Message Window

Located at the bottom of the CYMTCC screen, a message window will appear if you are opening a study containing a device that is not in the database or if a device contains a warning message.

The window will also appear when the Draw button of the device dialog is press and that the selected device contains a warning message.

This window will also show you different error messages, warnings or suggestions.



Column

1 Row Number.

2 Type of Message. (Warning or Error)

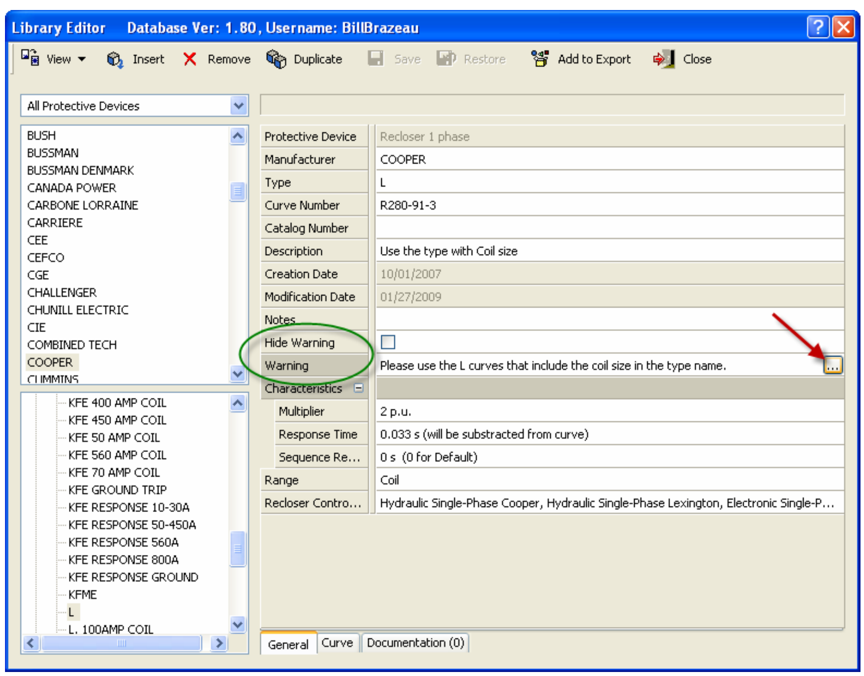
3 Device Name. Click on the device name to open the **Device Properties** dialog box.

4 Name of the study.

5 Do not Show again. If you don't want to see this message again, click the button.

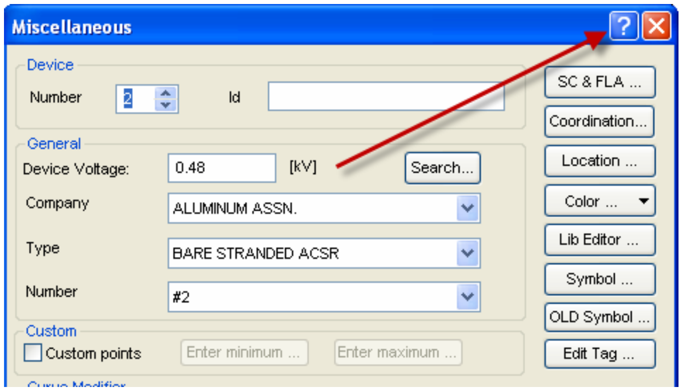
1.7.6.1 Add a warning to a device type

From the **Device Properties** dialog box, select the type you would like to add a warning on and click the Lib. Editor Button. The library editor will open; add a message in the warning field. Click the the warning field then click the … button to enter you message. (See Warning Message in chapter 17.5)



1.8 Help Button in Dialog Boxes

If you need help about a specific dialog box, click the question mark icon located at the top right corner of the dialog box.



Chapter 2 The One-Line Diagram

2.1 One-Line Diagram Window

The One-Line Diagram (OLD) Window is the workspace where the user will create and edit the one-line diagrams.

2.1.1 OLD Workspace Elements

Canvas

CYMTCC provides a drawing surface abstraction, also known as the *canvas*, onto which you can draw and manipulate symbols and graphics. Each canvas has a grid that can be shown behind the diagram. You can use the grid to align graphical components.

Objects on the canvas encapsulate graphical elements that can be moved, rotated and connected. CYMTCC comes with predefined symbols that you can drag and drop into drawings, connecting and positioning them precisely to create your schematics.

CYMTCC also provides a set of tools, such as lines, arcs, polylines, rectangles and circles, for drawing additional elements.

Component

A component is an object drawn onto the canvas. Device symbols and drawing entities (such as lines, text, ellipses, and rectangles) are examples of components. Components have a logical position and occupy a rectangular area on the canvas. Components can be assigned properties such as fill color, line color and font that determine their appearance.

Symbol

Each symbol has its own unique functionality and characteristics specific to the one-line diagram. Symbols are designed to be moved or connected in logical ways only. For example, when you drag the symbol “fuse” onto a canvas and drag it close to a target symbol, the fuse aligns correctly to connect with the target symbol. Symbols are designed to behave in specific ways suited to the one-line diagram they are intended for.

Properties

“Properties” provide a flexible and dynamic way of associating fonts, line style, colors, or other features to a component. Each symbol is defined by properties, some of which you can change to modify or format the symbol. To view or change the symbol’s properties, select the symbol on the canvas and right-click. Select Symbol Properties on the menu. Each time you drag a symbol from the symbol window to a drawing, you create a copy of the symbol that looks similar to the parent symbol.

Control Handles

Control handles (or anchors) are small boxes that appear on a symbol when you select it. A symbol always has eight control handles that define a box enclosing the symbol.

Links and Ports

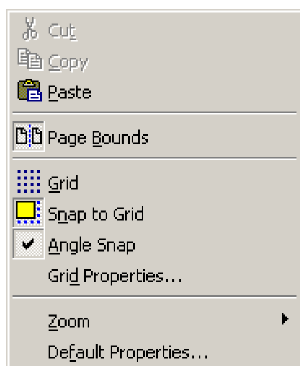
Links are lines or polylines that connect two symbols by snapping to ports. A port defines a location on a symbol at which other symbols can be connected. A link binds together two ports. Symbols have normally a port on either endpoint. Once you connect two symbols with a link, they remain connected when you move either symbol. The link changes shape and size to accommodate the move. Link uses the current line format. For example, if you want connectors to have a different color, change these properties in the **Property** dialog box when nothing in the one-line diagram is selected. See 2.2.3 Connecting Symbols.

Labels

Labels are text components that you can use to annotate a symbol. There are two of those labels: the Symbol Label (see 5.3.11 Symbol) and the Symbol User Label (see 2.1.2 One-line Diagram Contextual Menu, below)

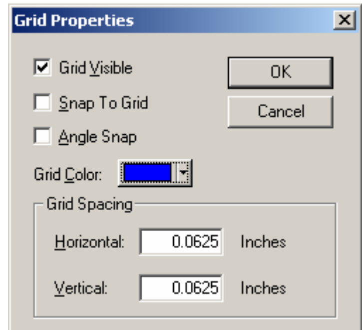
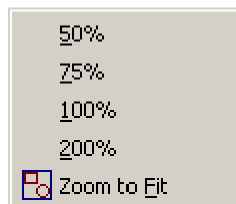
2.1.2 One-line Diagram Contextual Menu

Right-clicking in the background of the One-Line Diagram window will display a contextual menu that provides page management options to make quick changes. This contextual menu concatenates commands you can access through the **View** > **One Line Diagram** menu item, and a quick zoom option. Complete Default Properties can also be accessed through **File** > **Properties** menu commands. (See section 3.10 Preferences for details).



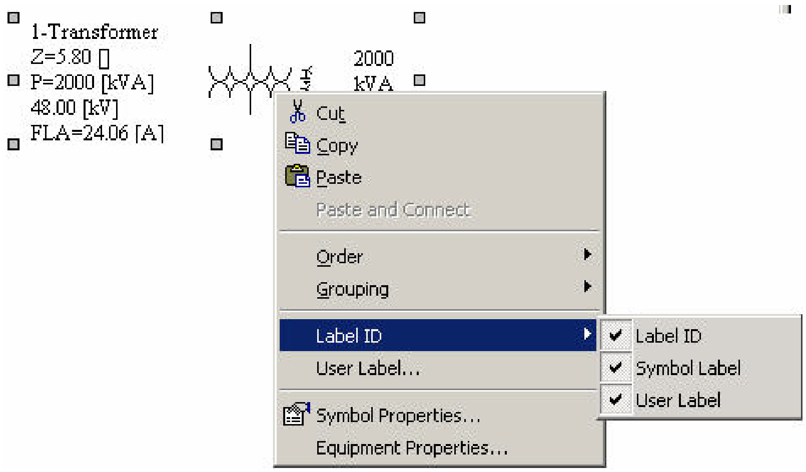
The commands include:

Page Bounds	To display or hide the page boundaries of large drawings.
Grid	To display or hide the grid.
Snap to Grid	To align to the grid the top left handles of each component in your diagram.
Angle Snap	To limit the rotation of objects to fifteen-degree increments.

Grid Properties	To display the **Grid Properties** dialog box to change the distance between the points of the grid or to change the color of the grid. 
Zoom	Provides an extra way to quickly zoom on your one-line diagram. As follows: 
Default Properties	To define the overall properties of the components in the drawing. Note, however, that this will apply to the next components you will add to your one-line diagram. The properties that can be set are: Line, Fill and Font, refer to section 3.10 Preferences for more details. **Note**: If you want to change the properties of a component that is already in your drawing, left-click on that object and right-click to access its contextual menu, or through the corresponding **Edit > Symbol Properties** menu item.

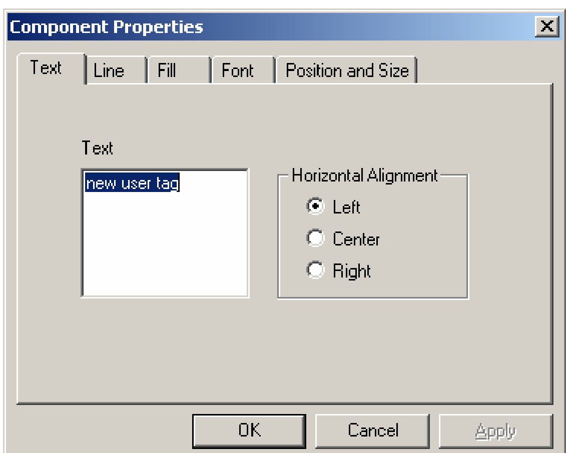
2.1.3 OLD Symbol Contextual Menu

Selecting a symbol on the OLD and right-clicking on it will display a contextual menu that provides quick access to a number of commands to make changes to that symbol.



The Label ID commands allow to show or hide the **Label ID** (symbol identification elements), the **Symbol Label** (entered through the **Symbol** command of the **Device Settings** dialog box (see section 5.3.11), or the **User Label** which is an extra function to describe your device. (see below)

The **Symbol User Label** is a text component that you can use to annotate a symbol. Select the symbol and right click on it to get the menu for adding text via the command **User Label**.



The **Symbol Properties** (section 4.10) and the equipment properties (see section 5.1 Device Creation) commands will display the corresponding dialog boxes.

2.2 Inserting and Connecting Symbols

2.2.1 Adding a Symbol

There are three ways to insert a symbol into your one-line diagram:

- **Drag and Drop** – Click a symbol in the Device Search, Create Equipment Favorite or Settings window of The Multi-Explorer (see Chapter 16), then drag the symbol over the canvas and drop it.
- **Double click** on a symbol in the Device Search, Create Equipment, Favorite, Settings window of the multi-Explorer.
- **Select** an equipment from the Create Menu. (Section 5.2)

2.2.2 Moving / Copying Symbols

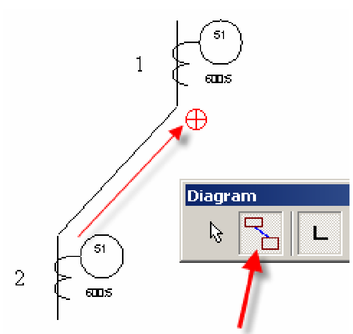
You can do this two ways:

- Select the symbol and drag it to a new location. To keep a copy at the original location, hold down the CTRL key while dragging.
- Select the symbol and right-click on it to select **Copy** or **Cut** from the menu. To paste, right click where you would like the symbol to be on the canvas, and select **Paste** from the menu.

2.2.3 Connecting Symbols

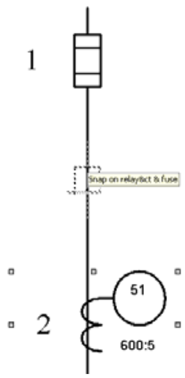
CYMTCC provides two methods to allow the user to connect two symbols on the one-line diagram:

Link command method:



1. To connect two symbols, click on the **Connect** button located in the **Diagram Toolbar** (see 1.6.5) to activate the Connection mode.
2. Position your mouse over the first device until the mouse pointer changes to a red circle. When it does, click on the left button of the mouse and hold it down, the mouse pointer will change to a plus sign.
3. Still holding the button down, move your mouse to the second device to connect until the mouse pointer changes again to a red circle, click twice on the left mouse button to connect the two devices.

Drag-and–drop method:



1. Go to the **Create Equipment Tab** of the Multi-Explorer pane (see 16.6). Select your symbol by clicking on its name in the list with the left mouse button and hold the button down while you drag the symbol over the OLD workspace.
2. When the symbol approaches a target symbol, a mouse tooltip is displayed.
3. Allow the symbol to snap to the target symbol. Release the mouse button.
4. The **Settings** dialog box of the new device will be displayed. Complete it, and click the **Draw** button: the two symbols are connected.

2.3 Manipulating Components

CYMTCC provides you with a range of actions that you can perform on the symbols.

Before you can enable the actions, you must have the appropriate toolbar available. You must also be located on the **One-Line Diagram workspace** rather than on the **Plot workspace**. Left-click once on the One-Line Diagram window to activate it.

To make the toolbars available, go to the **View > Customize** menu item. You will get a list of toolbars. Click on the ones you need. (see section 1.6.2 CYMTCC Toolbars) Once the toolbars are in place, you can easily enable:

- Selection
- Movement
- Rotation
- Scaling
- Alignment
- Cut, Copy, and Paste

You can also perform these advanced actions:

- Grouping/Ungrouping
- Stacking Order (Z-Order)
- Grid Alignment
- Defining relationships between symbols

2.3.1 Selecting a Component

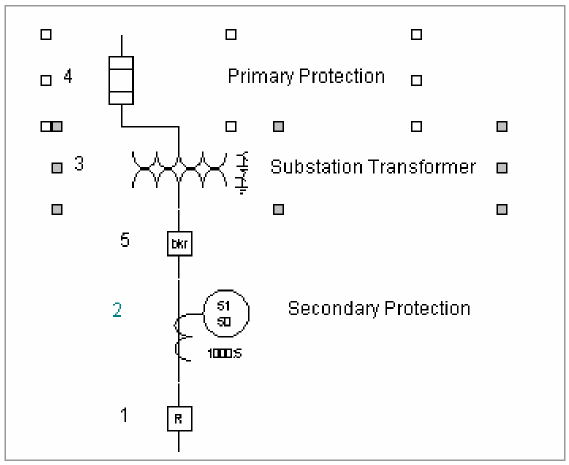
By default, the application starts in Selection Mode. If you are not in Selection Mode, you can switch to it by clicking the **Selection** tool button. See 1.7.1 Device Selection about the various ways available to select a symbol.

When a device is selected:

- its set-up data is displayed in the Status Bar, at the bottom of the CYMTCC application window.
- its symbol is highlighted on the one-line diagram (when displayed).
- its name appears in the Device List box in the Main Toolbar.

You can select a single component by clicking it while the Selection Mode is activated. If you want to select multiple components, hold the CTRL key and then click each of the components you want to include in the selection, or click and drag in an empty space to draw a selection rectangle.

The last component selected for a multiple selection is distinguished from the others by its grey selection handles. The grey handles are used to indicate that it is an anchor component. The editor uses anchor components as a reference for alignment operations. If you want another component to serve as the anchor, hold the CTRL key and then click on another component within the selection. The editor transfers the grey handles from the previous component to the selected component.



To deselect a single component from a group, press the SHIFT key and click the component you want to exclude from the selection.

2.3.2 Moving a Component

When in Selection Mode, you can move certain components by clicking them and dragging the mouse. When you place the pointer over a component that you can move, the mouse pointer changes to a "can move" pointer. If the **Snap to Grid** option in the canvas is enabled, the top left corner of the component's bounding box aligns with the grid.

You can easily line up multiple components using the alignment operations. The anchor component in a multiple selection, which is distinguished by its grey selection handles, is the point of reference to which all other components in the multiple selection align. You can align objects horizontally (top, center, bottom) or vertically (left, middle, right).

You can slightly move the selected components using the "nudge" operations. These commands move the components by one unit by default and by five units if you are holding the SHIFT key. You can nudge an object up, down, left or right.

2.3.3 Rotating / Flipping a Component

To rotate the selected component to any angle, click the **Rotate** tool button . Now when you place the cursor over a component that can be rotated, the mouse pointer's shape changes to reflect this . Click the component you want to rotate or one of the components in a multiple selection and then drag the mouse to rotate the component in place. If you hold the SHIFT key while rotating, the rotation snaps to fifteen-degree increments. The same effect occurs automatically if you select the **Angle Snap** option in the canvas (right-click menu or the menu option **View** > **One Line Diagram** > **Angle Snap).** You can also rotate the component by ninety-degree increments using the **Flip Left** or the **Flip Right** toolbar commands; and also flip the component vertically or horizontally.

2.3.4 Grouping and Ungrouping Components

You can group components together to form composites using the **Group** button . Select the components you want to group together by forming a rectangle around them and then clicking the **Group** button. Grouped components act like a single graphical component. Any change you make to a composite affects each of its components. Because a composite is also considered a component, you can create a composite that is composed of other composites.

To ungroup a composite object, select the composite you want to ungroup and then click the **Ungroup** button .

2.3.5 Ordering Components

The individual components in a diagram understand the concept of a stacking order, also known as z-order. Stacking order determines where each component is drawn in the stack. In other words, the order determines which component is drawn last. The last drawn component is shown over the components already on the canvas. Z-order is determined by the order in which the components are added to the diagram. The last component to be added will be on top.

You can change the default order with the order commands. You can change the order of the components by moving a component either one place forward or backward, or by sending a component to the front or back of the stack.

2.4 Drawing Capabilities

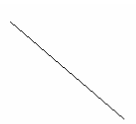
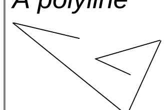
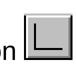
CYMTCC contains the same graphic primitives available in most drawing applications:

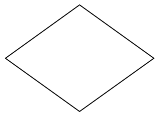
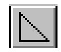
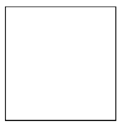
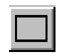
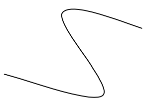
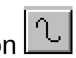
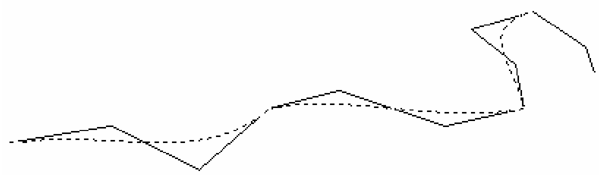
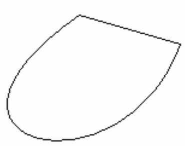
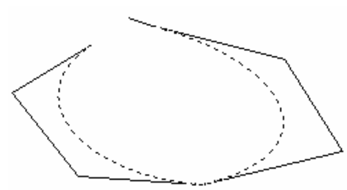
- Line
- Polygon
- Rectangle
- Curve
- Closed curve
- Ellipse
- Text
- Image (bitmap)

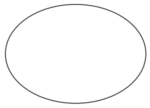
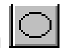
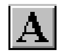
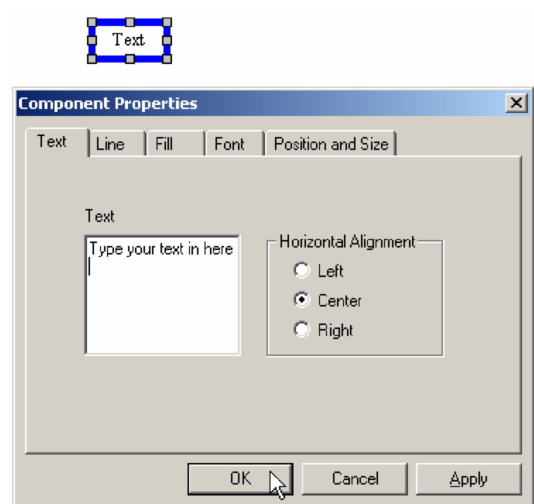
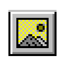
In CYMTCC, you insert a symbol into the canvas by selecting a tool button in the **Drawing Toolbar** (see 1.6.7), placing the pointer in the canvas, and then clicking the left mouse button. In addition to providing this functionality, CYMTCC also enables you to draw primitive components using the methods described below.

You can assign line properties (color, width) to each graphical component, and fill properties to the closed shapes (rectangle, closed curve, etc.)

2.4.1 Drawing Lines and Shapes

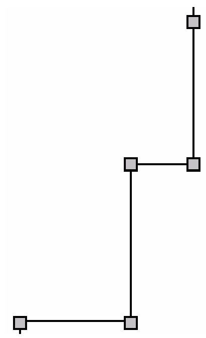
To Draw:	You will:
A component of equal proportions or at a 90 degrees angle.	Hold the SHIFT key while drawing a component. For example, if you select the **Rectangle** tool button and then click in the canvas while holding the SHIFT key, the application will draw a square.
A component centered on a point.	Hold the CTRL key while drawing a component.
A line 	Click the Line button  and then click and hold the mouse button in the canvas until the line is of the appropriate length.
A polyline 	Click the **Polyline** button  and then left-click on the canvas to place the first vertex. Release the mouse button and move the cursor to the location of the next vertex. Click again to place a vertex. Double-click to place the last vertex and finish the polyline. Click the right mouse button to cancel the action (before placing the last vertex).

To Draw:	You will:
A polygon 	Click the **Polygon** button  and then left-click on the canvas to place the first vertex. Release the mouse button and move the cursor to the location of the next vertex. Click again to place a vertex, and so on. Double-click to place the last vertex and finish the drawing. Click the right mouse button to cancel the action (before placing the last vertex).
A rectangle or a square 	Click the **Rectangle** button  and then click and hold the mouse button in the canvas, positioning the pointer to a corner of the rectangle or the square you wish to draw. Drag the pointer until the rectangle is the width and length you want. (Press SHIFT to draw a square.)
A polycurve 	Click the **Polycurve** button  and then click in the canvas to place the first vertex. Release the mouse button and move the cursor to the location of the next vertex. Click again to place a vertex, and so on. As you place the vertices, CYMTCC displays a dotted line that shows the shape of the finished line. Double-click to place the last vertex and finish the drawing.  Click the right mouse button to cancel (before placing the last vertex).
A closed curve 	Click the **Closed Curve** button  and then click in the canvas to place the first vertex. Release the mouse button and move the cursor to the location of the next vertex. Click again to place a vertex, and so on. As you place the vertices, CYMTCC displays a dotted line that shows the shape of the finished line. Double-click to place the last vertex and finish the drawing. If you do not place the last vertex at the same position than the first one, CYMTCC will do that automatically.  Click the right mouse button to cancel (before placing the last vertex).

To Draw:	You will:
An ellipse or a circle 	Click the **Ellipse** button  and then click and hold the mouse button in the canvas until the ellipse or the circle has the shape and the size you want. (Press SHIFT to draw a circle.)
To add text	Click the **Text** button  and then click in the canvas to position the box. Right-click on that box to access the Component Properties dialog box and type your text the Text field. Click **OK** when done. You can modify your text or adjust the text properties by right-clicking on the text component to access again the **Component Properties** dialog box. 
To insert an image	Click the **Image** button  to open a standard **Open** dialog box from which you select an image in either .bmp or .dib format. Click **OK**, and then left-click once on the canvas at the position where you want the image to be inserted.

2.4.2 Editing Vertices

When you select a primitive component such as a line or a rectangle, the editor places control handles at each vertex defining the shape. You can manipulate these vertices to change the shape of a component. However, these commands do not apply to all components. For example, if you had a line component with only two vertices, you would not be able to delete a vertex.



Moving a Vertex – To move a vertex, position the mouse over a control handle. The cursor changes to signal that you can move this vertex. Click the control handle and keep the mouse button pressed while dragging the vertex to a new position. Release the mouse button to place the vertex at its new coordinates.

Inserting a Vertex – To insert a vertex, move the mouse between two control points and hold down the CTRL key. The cursor changes to signal that you can insert a vertex. Click the mouse button to place the vertex on the line segment.

Removing a Vertex – To remove a vertex, move the mouse over a vertex and hold down the CTRL key. The cursor changes to signal that you can delete the vertex. Click the mouse button to delete the vertex from the component.

Chapter 3 The File Menu

3.1 Overview of the File Menu

When you start working with CYMTCC, you will either create a new study or work on an existing one. A study consists of the following:

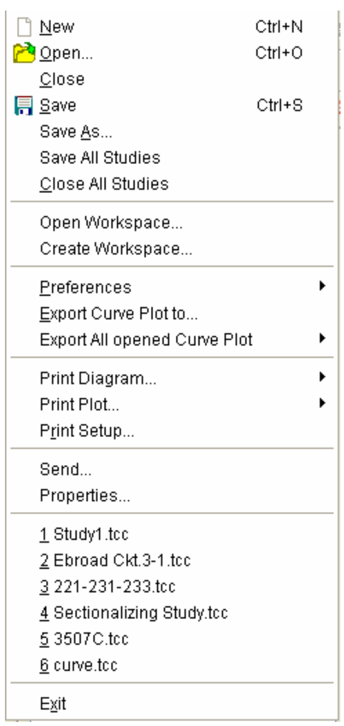
1. A Time-Current Curve Plot,

2. A One-line diagram,

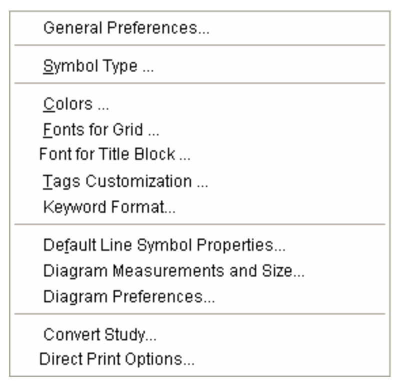
Studies may be opened, saved and printed by using the commands in the File menu. Commands may be activated by selecting them from the menu or, in some cases, by clicking on an icon.

Several studies may be opened simultaneously. You may move from one to another by clicking in the window of the desired one, to make it the active window.

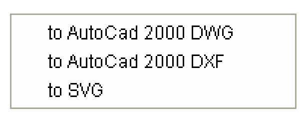
The File Menu



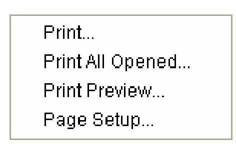
The Preferences sub menu



The Export All opened Curve Plot to sub menu



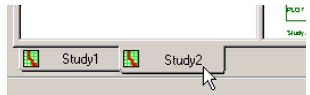
The Print Diagram and Plot sub menu



3.2 New

This file command opens a new blank study. By default, CYMTCC opens the new study under the name "Study1.TCC". (if you open another new study, the name will be "Study**2**.TCC", and so on).

A window opens with one pane for the One Line diagram and another pane for the Curve Plot. All opened windows are automatically tiled. You may change the study name by using **File > Save**.



3.3 Open

This command opens an existing study. A standard Windows **Open** dialog box appears, through which you can navigate through your directories and select the file to open. You may list all files in any directory and drive. The study file extension is .tcc

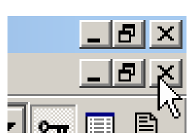
Select one by any of these three methods:

1. Double-click on its name.
2. Click once on its name and click on the **Open** button.
3. Type its full name and path, and click on the **Open** button.
4. Select more than one file (with the mouse or by holding down the Shift or CTRL button on your keyboard) and click the **Open** button.
5. Double clicking on the file name.
6. Drag and drop one or more studies on the CYMTCC desktop icon or on the *Cymtcc.exe* file.

A window opens with one pane for the One Line diagram and another pane for the Curve Plot. All open windows are automatically tiled.

3.4 Close

This command closes the active study file. If you have modified the study since you last saved it, CYMTCC will ask you whether you want to save the study. If you close without saving, you lose any modifications made since the study was last saved. Clicking on the **X** icon at the top right corner of the window has the same effect.



3.5 Save

Saves the active study under its file name. If the study is a new one, CYMTCC performs the **Save As...** command instead.

<u>Note</u>:	Old CYMTCC “DAT” files will be saved as “TCC” files. The old file is <u>not</u> changed.

It is recommended that you **Save** regularly to reduce the risk of data loss in case of power failure. It is good practice to save the current study before opening another one.

<u>Note</u>:	You can use the **Auto-Save Manager** available in the Tools menu to enable the auto save and/or the auto recovery option. (See chapter 3.10.1.2). Also, CYMTCC creates a backup copy of your file for you. If the study to be saved already exists, the existing file is renamed with the ".BAK" extension before the **Save** is carried out. You can open the “BAK” file.

3.6 Save As

Prompts for the name of a file in which to save the study, and then saves it there. This command is useful for making studies, which are very similar to others.

You may type in the path and the name of your file in the **File Name** box and click on the **Save** button.

You may also select a drive and directory, then type in or select a file name, and click **Save**.

3.7 Close All Studies

This command closes all opened studies. If you have modified any studies since you last saved them, CYMTCC will ask you whether you want to save each one. If you close without saving, you lose any modifications made since the studies were last saved.

3.8 Open Workspace

Allows you to open an existing workspace saved on your computer. This command is also available by right clicking on the workspace area located in the Multi-Explorer.

(For more information see 16.2 Workspace Tab)

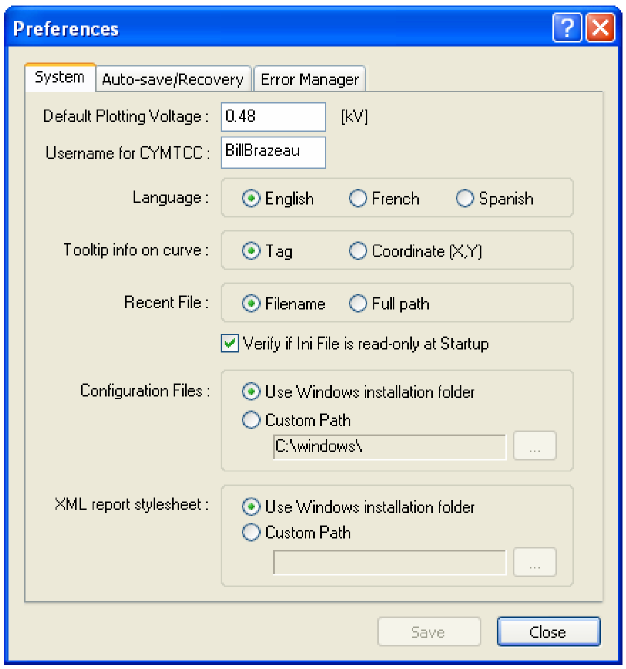
3.9 Create Workspace

This command will open the **Create Workspace** dialog box. (For more information see 16.2 Workspace Tab)

3.10 Preferences

3.10.1 Options

This menu command displays the following dialog box, which you use to define overall parameters. These settings are persistent, meaning that they will be used for all subsequent CYMTCC sessions.



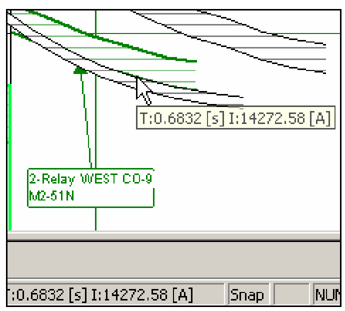
3.10.1.1 System Tab

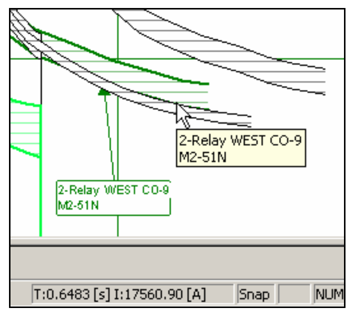
Plotting voltage	When you open the program or a new study, this default value will be set as your study voltage. The new value becomes the new default.
User name used by CYMTCC	CYMTCC is saving the users name when a study file is saved (See 3.17 Properties) or when a modification is done in the library (See Library Editor in section 13.3).

<table>
<tr><td>Language</td><td>
You have the possibility to select from three different languages: English, French and Spanish. The default selection is based on the selection made during the software installation. To change the language, make your selection, click the Save button and restart CYMTCC.
A number of different options are based on language; including the following.

CYMTCCRes.dll: Interface and messages
Readme.htm
Online Help
Arc Flash labels

</td></tr>
<tr><td>Tip info on curve</td><td>
When you move the mouse over a curve in the plot, a mouse tooltip is displayed. With this option, you can select if the tooltip will display the time-current position (Display x,y coordinate) or the equipment information (Display tag).
<u>Note</u>: The time-current position is also displayed in the Status Bar regardless of the type of tooltip selected.





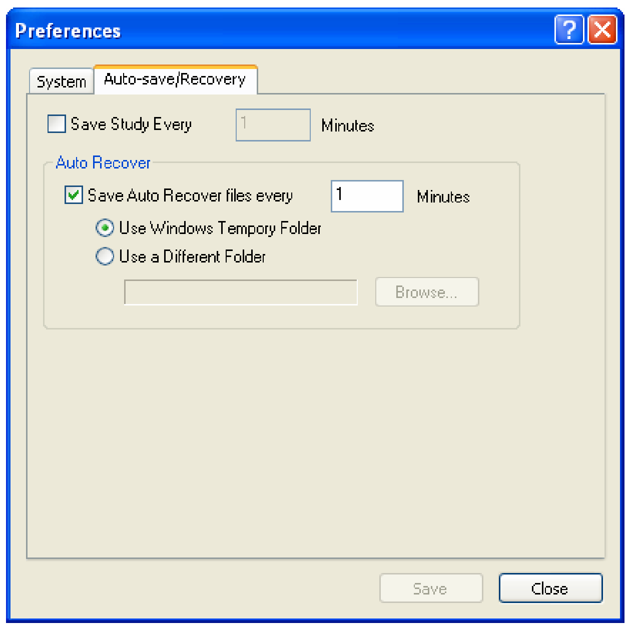
</td></tr>
<tr><td>Recent Files</td><td>
The Recent Files list is located at the bottom of the file menu. It shows the last six studies that were opened. You can select to display the files by study name (File Name) or by study name with full path (Full Path)
</td></tr>
<tr><td>Ini File check at startup</td><td>
At program startup, CYMTCC will verify if your Cymtcc.ini file is read-only. If this is the case, a warning message will let you know If you continue working with the Cymtcc.ini in read-only, your settings/ parameters, such as default curves color, default grid type and many more, will not be saved and you will have to select those settings every time a new study is created.
</td></tr>
<tr><td>Configuration File Path: Cymtcc.ini</td><td>
To select another location for your INI files.
This is in case the user does not have the rights to modify files located in the Windows folder. In order to make this modification, you have to login with an account that as the rights to modify the registry. Once the modification is done, the user can login with its regular account and use the software knowing that all its settings will be saved.
</td></tr>
</table>

Configuration File Path: XML report Style sheet folder	When the XML reports are generated, files are created, by default, in the CYME\CYMTCC\StyleSheet folder (See XML Format in section 9.2). If the user does not have the rights to modify or create files located in this folder, the report cannot be generated. This is why it might be necessary to modify the location of these files. In order to make this modification, you have to have the rights to modify the *Cymtcc.ini* file.

3.10.1.2 Auto-Save Manager Tab

This option gives you the possibility to automatically save at a regular intervals all your opened studies that have been modified.

Also, you can create a recovery file in case the program did not close normally.



1. Activate the **Save Study Every** …
   - Check the **Save Study Every** checkbox.
   - Enter a value in minutes.
2. Activate the **Auto Recover**
   - Check the **Save Auto Recover** checkbox.
   - Enter a value in minutes.
   - Specify the folder where you want your auto-recover file to be saved in. It is important to use a folder that you can create files in. Usually, the “temp” folder will work. If it is not the case, select the **Create in other directory** option and click the **Browse** button to select the folder.

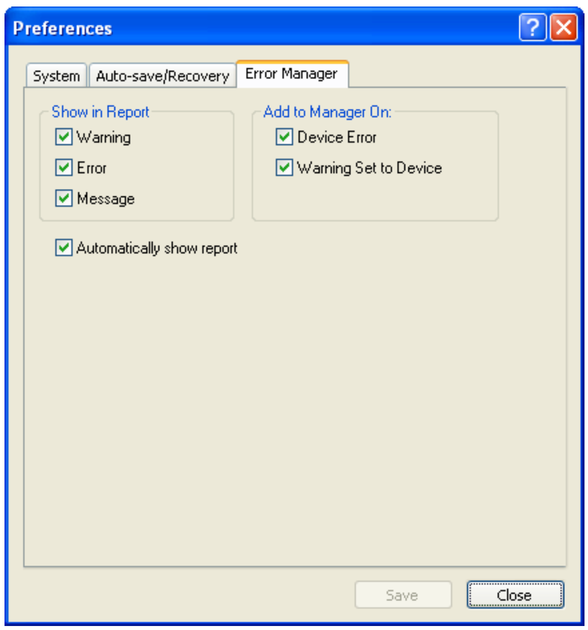
How the Auto-Recover works

- At the interval indicated, a copy of your opened studies will be saved in the specified folder.
- If the program exits normally (i.e. closed by the user), the studies file located in the recovery folder will be deleted.
- If the program does not close normally (power failure or crash), when you restart CYMTCC, you will have the possibility to reopen those studies.

Note:	A folder named Cymtcc_rec will be created under the selected recovery folder.

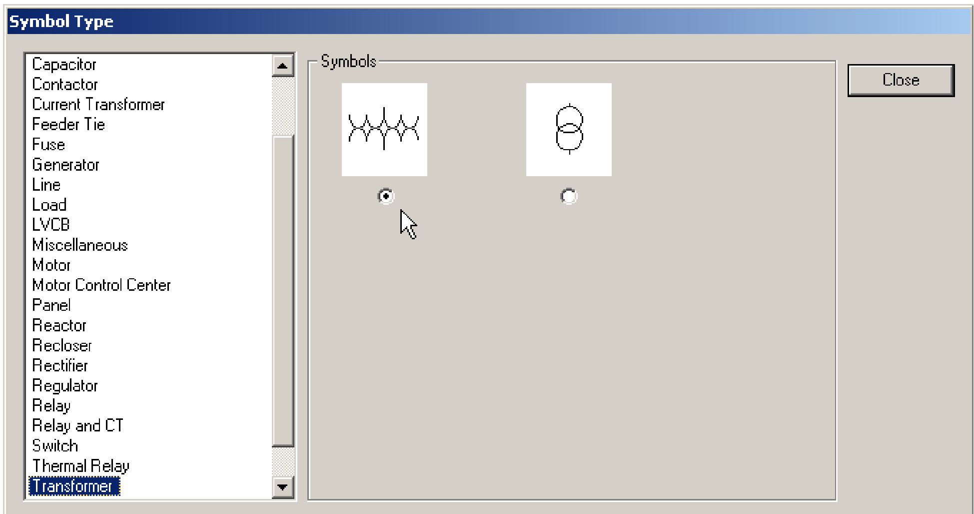
3.10.1.3 Error Manager Tab

(More to come)



3.10.2 Symbol Type

Displays the **Symbol Type** dialog box, with which you can assign a symbol to the each equipment type.



1. Select an equipment type from the list by clicking on its name. This will display the available symbols in the right part of the dialog box.

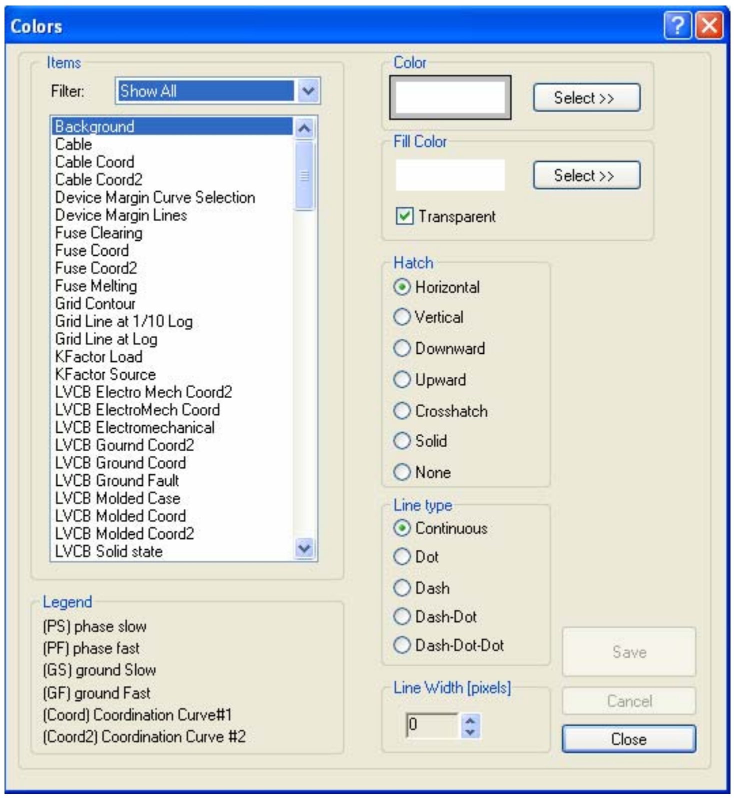
2. To select the desired symbol, click on the radio button underneath the symbol you want.

Note: The change will only apply to the next devices created.

3.10.3 Colors

This option applies to the colors of the curves of the devices displayed in the Plot workspace. It is also possible to set a specific color to each symbol.

With the **Colors** dialog box, you can assign color, hatching, line type and line thickness to the curve of each type of equipment. You may also change the colors of the grid lines and the background (respectively “Grid” and “Background” in the **Items** list). You also have the possibility to change the one line diagram symbol color.



1. Select one or more item from the list by clicking on its name. Hold down the CTRL key on your keyboard to do a multiple selection.

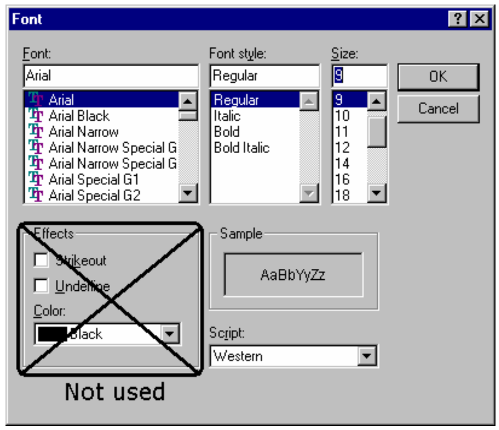
> **Notes**:
> - If you have selected more than one item, check the settings you would like to change.
> - Use the **Filter** to list items specific to the selected device or curve type.

2. Select the **Hatch** and **Line type** you want by clicking on the appropriate choices.
3. Adjust the **Line Width** by clicking on the up and down arrows.
4. Click on the **Select >>** button to choose a color from the available ones.
5. Click on the **OK** button when you have finished.

> **Note**: The change will only apply to the next devices created. Existing curves are not affected. You can modify those individually (See 5.3.9 Colors.)

3.10.4 Font for Grid and Font for Title Block

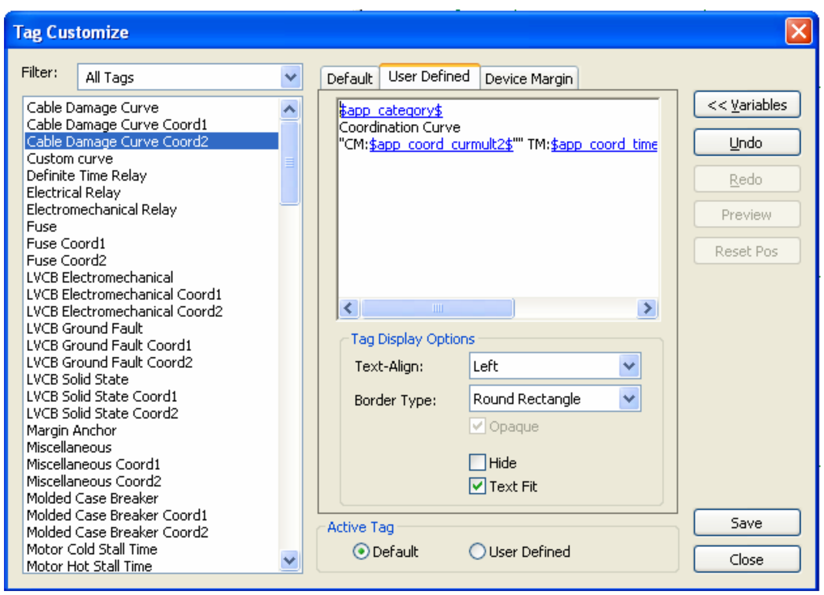
Displays the standard Windows **Font** dialog box through which you may choose the one font, style, and character size for all the text appearing in the Curve Plot Workspace (Grid) or the font size for the Title Block Information window. Click on **OK** to save your selections. The **Effects** group box commands are not used.



Note:	In the Time/Current plot, the text color is the same than the curve color. To change the font and the color of the text in the One-Line Diagram, right click on the text label and select **Symbol Properties**.

3.10.5 Tags Customization

This option is used to access the dialog box through which you can edit the **default** contents of device tags.



To edit the tag format, select the device tag you would like to modify then, in the user defined tab, type in text and insert keywords via the << Variables button and click **Save**. If you would like to use this new tag, make sure to select **User Defined** in the **Active Tag** group box.

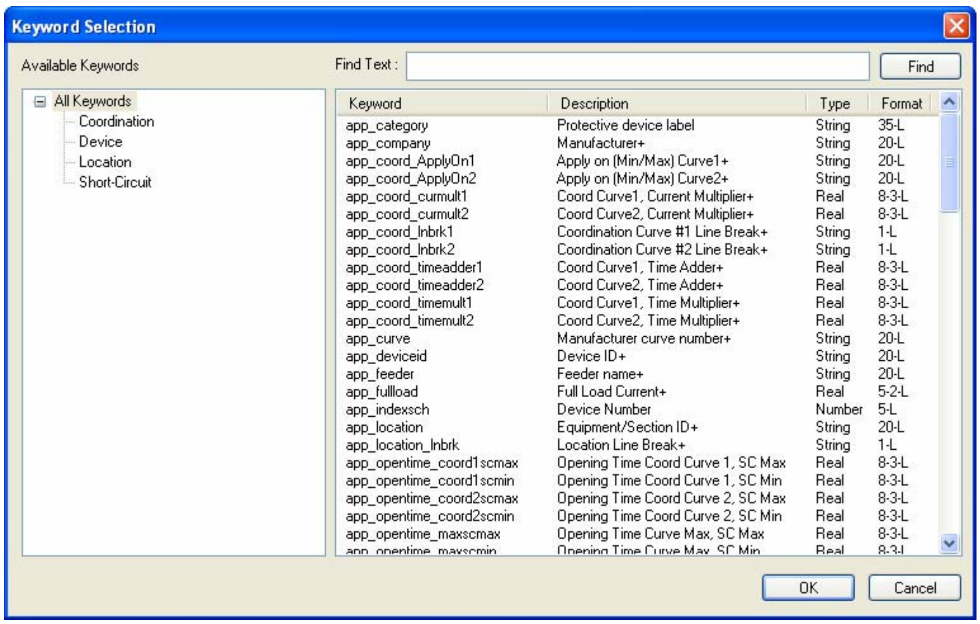
Note:	If a variable is placed between quotes, its value will not be displayed if the variable returns an empty string, zero or if its option is not enabled. If extra text is placed between the same quotes, it will also not be displayed. Example: "SC max: $app_scmax" If the SC Maximum value is set to zero, the line will not be visible in the tag.

Find Text	Use this option to display a limited number of device tags based on your selection.
All Keyword	Allows viewing variables from specific categories such as: Coordination curves, Short-Circuit and location.
Device type List	To show all the tag types based on the **Filter** selection (see above).
Default tab	Shows the tag for the selected item that comes with the program. This window is read-only.
User Defined tab	To create your own custom tag. Copy/Paste the default tag if you simply want to make a small modification.
Device Margin tab	To define how the device name will be shown in the **Device Margin** result box. (See 10.2)
Current Device tab	When you edit the tag of a specific device in a study, the Current Device tab will also be visible. When editing through this box and clicking on **Save**, the changes will only apply to that specific device in your study. (See **Create menu > Common > Edit Tag** in section 5.3.13)
Tag Display Options	Lets you specified how you want your tag to be displayed. • Text Alignment: left, center or right. • Border Type: round rectangle, rectangle or no border. • Opaque: currently not active. • Hide: Will disable the tag on the plot, the curve will still be visible. • Text Fit: for the text will not extend outside the borders. **Note**: Those options are not available at the Default and the Device Margin tabs.
Active Tag	Lets you specify if you want the "Default" or the "User defined" tag to be displayed when a device is created.
<<Variables	Gets any variables from the CYMTCC list associated with the selected device.
Undo	Nullifies the last modification.
Redo	Cancels the last Undo.
Save	Saves the **User Default** tag and the **Active tag selection** in the *cymtcc.ini* file.

Preview	Lets you see the finished tag inside the dialog box, so that you may change it.

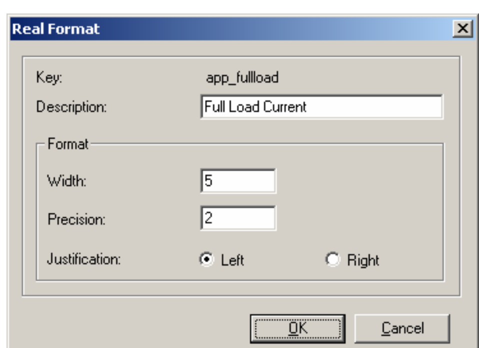
3.10.6 Keyword Format

Keywords are variable names that represent text (“string”) or numerical values. (Select the **File** > **Preferences** > **Keyword Format** menu command to display the **Keyword Modification** dialog box.



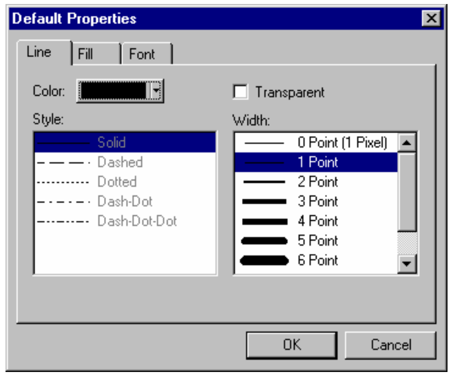
Select a keyword and click the **Modify** button to access the **Real Format** dialog box where you can change the:

1. Description of the keyword.
2. Length of these values (characters or digits).
3. Number of decimal places for numerical values.
4. Alignment (left or right) of the value in the tag.



3.10.7 Default Line Properties

Allows you to set the line type and thickness and fill pattern for the line that connects symbols together on the one-line diagram.

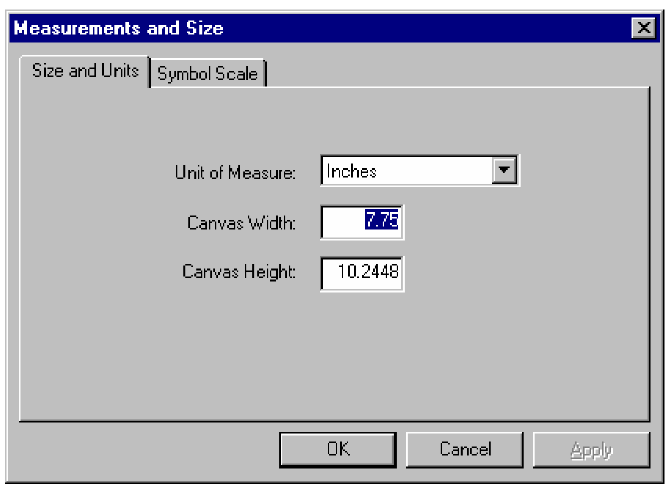


The default color of each symbol color can be changed using the Colors option located in the **File > Preferences** menu. (See chapter 3.10.3)

The color of a symbol in a study can be changed by using the **Colors > Symbol color** option located in each **Device Properties** dialog box. (See Chapter 5.3.9)

3.10.8 Diagram Measurements and Size

Allows you to define the size of the canvas for the One-Line Diagram workspace (Size and Units tab).

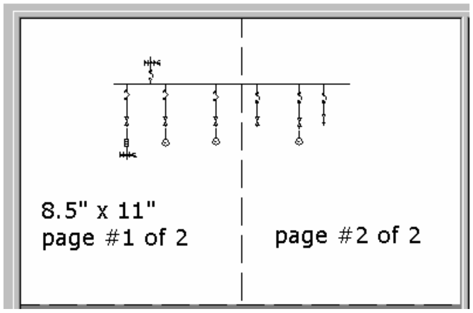


The Diagram will be sub-divided into pages for printing if the diagram is larger than one sheet of paper. The paper sheet size is defined in the **File >** Print Setup dialog box (See 3.13.4).

To view the borders of the individual sheets on the canvas, use the Diagram's contextual menu **Page Bounds** option, or click the **Page Bounds** icon  in the Diagram toolbar. You will see the edges of the canvas as you zoom out the One-Line.

The **Symbol Scale** tab allows you to display the symbols in the one-line diagram at a magnification other than 100%. Make them smaller (50%) if the diagram is going to be large.

In the example below, the one-line canvas is 11" x 17" and the page size is set to 8.5" x 11", and the "Page Bounds" function is active.

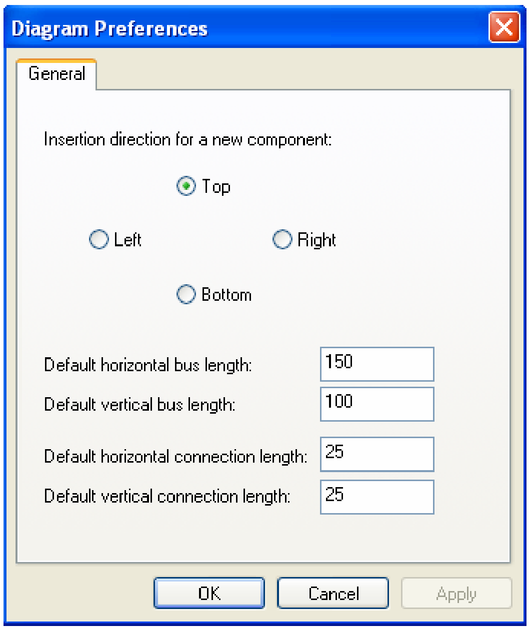


3.10.9 Diagram Preferences

Again for the One-Line Diagram workspace only, this function allows you to define the direction a new device symbol is facing when you create it.

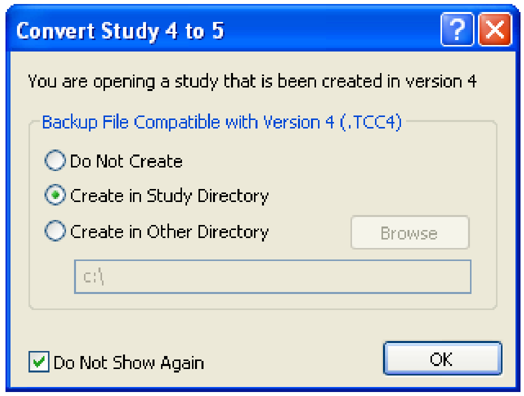
You can create sections that spread horizontally on your canvas (towards the left or the right) or vertically (towards the top or the bottom). For example, when you select **Right**, the next device created will be connected to the right of the previous device.

You can also define the initial length of a new bus symbol, even giving a different length to a bus that is created vertically (top/bottom). The numbers shown are relative sizes (i.e., 200 is twice as long as 100). Likewise, you may define the initial length of new connections between symbols.



3.10.10 Convert Study

When you open a study created with CYMTCC version, you will be asked if would like to make a backup of your file. The program provides you with three options: “Do not create”, “Create in Study Directory” (i.e. same folder than the study you are opening) or “Create Other Directory” (i.e. a different folder) that you can select by clicking the **Browse** button.



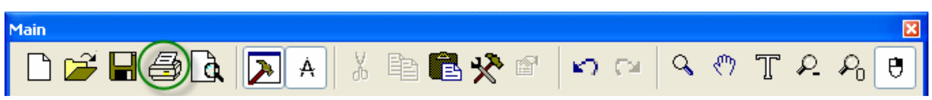
If you check the **Do Not Show Again** box, the next time you open a study created with version 4, CYMTCC will execute the option selected without warning.

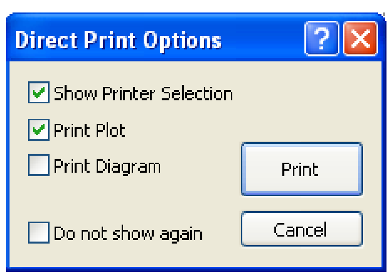
Note:	The studies created with CYMTCC version 5 are not compatible with previous versions of the software.

3.10.11 Direct Print

When you click the **Printer** icon of the Main toolbar, CYMTCC will ask you if you want to print the Plot and/or the One Line Diagram. You can also choose to display or not the printer selection box before the job is sent to the printer. Make your selection and click the **Print** button.

If you check the **Do not show again** checkbox, the next time you click the toolbar icon, CYMTCC will print the document(s) based on the selection made.

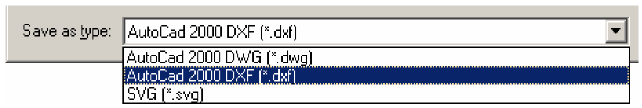




3.11 Export Curve Plot to…

This function allows you to save the curve plot to a DWG, DXF or SVG graphic file format.

DWG and DXF are formats supported by AutoCAD, while SVG is a language for describing two-dimensional graphics in XML that can be viewed in an Internet browser.



3.12 Export All Opened Curve Plots

Same option as **Export Curve Plot** to except that it will export all the opened studies to the selected format (DXF, DWG and SVG). When the option is selected the user has to select a destination folder. CYMTCC will then create one file per study using the study name and the extension of the format selected.

3.13 Print Diagram

3.13.1 Print

Selecting this command displays the standard Windows **Print** dialog box. Choose your printer from the list of those available to you, select the number of copies, and click **OK**.

3.13.2 Print All Opened

Same as the **Print** command except that it will print all the opened studies.

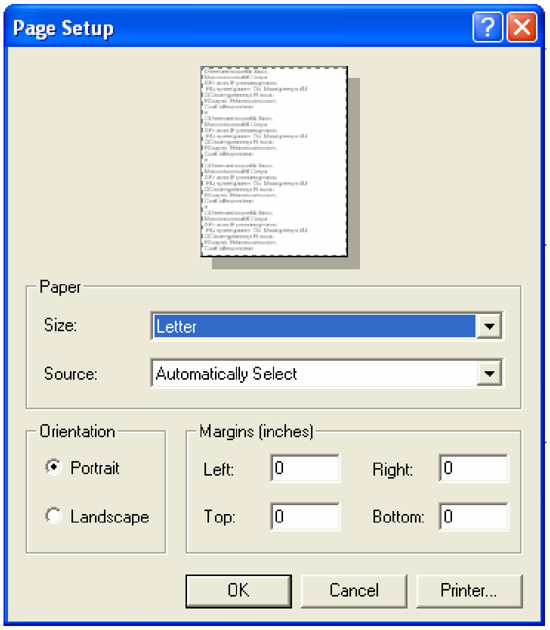
3.13.3 Print Preview

Display a full page view of your Diagram or Plot.

You may zoom in or out of this preview by clicking on the **Zoom** buttons at the top of the screen. You may also print from this view, via the **Print** button.

3.13.4 Print Setup

Displays the standard Windows **Page Setup** dialog box to allow you to choose the orientation of the paper, its size, etc., for the One-Line Diagram in your study.



3.14 Print Plot

3.14.1 Print

Selecting this command displays the standard Windows **Print** dialog box. Choose your printer from the list of those available to you, select the number of copies, and click **OK**.

3.14.2 Print All Opened

Same as the **Print** command except that it will print all the opened studies.

3.14.3 Print Preview

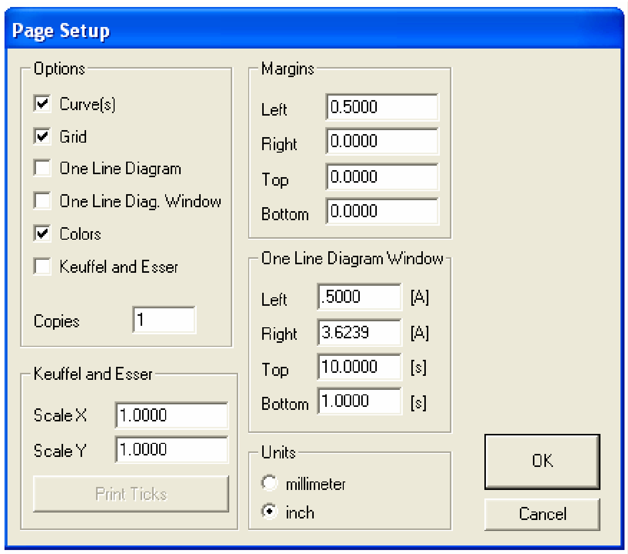
Displays a full page view of your Diagram or Plot. You may zoom in or out of this preview by clicking on the **Zoom** buttons at the top of the screen. You may also print from this view, via the **Print** button.

3.14.4 Print Plot>Print Setup

The **Options** group box contains various printing preferences. The first four are to indicate which Curve Plot elements you wish to print. The **Colors** check box when not checked will command the printer to print in black and white; this function is most useful when using certain types of plotters. Check the **Keuffel and Esser** check box when you will use pre-printed log-log grid paper in your printer.

The **One Line Diagram Window** group box allows positioning the OLD in the Curve Plot area. The positions to indicate will be based on the scale of the curve. (see also section 6.11.3 Other Plot Sub-Menu Options).

In the **Margins** group box, you can set the margins of the printout. The units utilized, (millimeters or inches) is set in the **Units** group box.

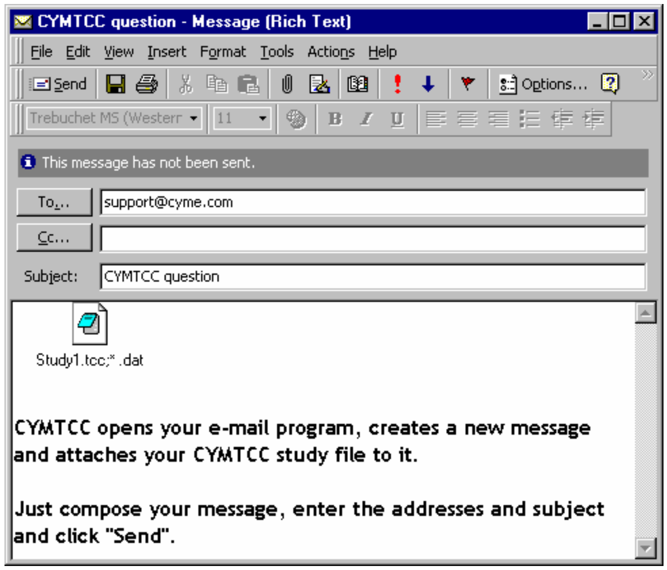


3.15 Print Setup

Use this command to change printers or printer settings. To change printers, click on the desired one in the list. To change printer settings, click on the **Setup** button in the dialog box. Do not forget to specify the communication port, the communication parameter settings, and the printer options (colors, paper size, portrait / landscape etc...)

3.16 Send

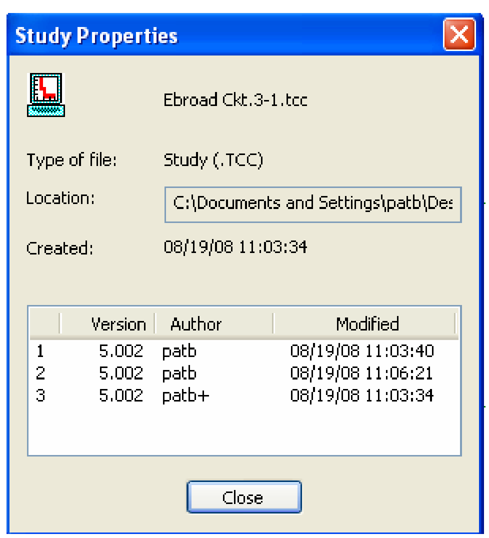
This command will open your e-mail program and attach your active study to it. Complete your message with the addresses and subject and click **Send**.



3.17 Properties

With this option, you can see the log of every time the file was saved (Only one save per session will be listed, the last one). It shows the version of CYMTCC when the file was saved and shows the name of the user who saved it with the date and time. See the **User Name** option at the **System** tab of the **File > Preferences> Options** dialog box (chapter 3.10.1).

When you see a “+” next to the user name, it means that an automatic update was done when the file was opened. Only the structure of the study database was modified, not the actual devices or settings. This only occurs when the study was opened with a more recent version of CYMTCC than the one with which the file was created.



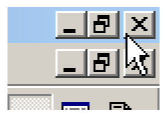
3.18 List of Studies

Lists the path and filename of the six (6) most recently studies accessed. You may open any of them by clicking once on its name in the list.

You can specify if you want to see the file name only or with its full path. See **File > Preferences > Options** dialog box, at the System tab (chapter 3.10.1)

3.19 Exit

Exits from CYMTCC. You will be asked to confirm your intent to exit. If you have made changes to a study and have not saved it, CYMTCC will ask whether you want to save the changes you have made.



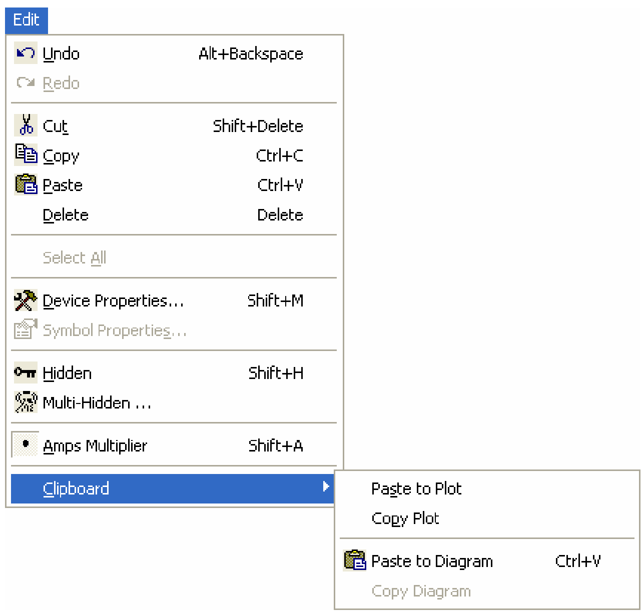
Clicking on the  icon of the CYMTCC application will have the same effect than using the **File > Exit** menu command.

Chapter 4 The Edit Menu

4.1 Overview of the Edit Menu

These menu commands provide the basic editing functions available for the One-Line Diagram and the Curve Plot drawings.

The menu commands that will be available will first depend on which of the One-Line Diagram or the Curve Plot workspace is active. Also, in order to be able to perform most editing functions, **the device in question must first be selected.** Refer to Section 1.7.1 Device Selection.



4.2 Undo

Reverses actions like changing a device setting, moving a symbol inside the One Line, creating a new device in your study, etc. You may undo actions in the reverse order only.

4.3 Redo

Reverses the last “Undo”. May be used repeatedly if several actions have been undone.

4.4 Cut

Removes the selected device from the study but stores it in the CYMTCC clipboard. (Equivalent to pressing the CTRL and X keys together or the Shift and Delete keys together.) Use **Paste** (Section 4.6) to re-insert the device, elsewhere in the One-line diagram, or even in another open study.

If you press the Delete key only, the element will <u>not</u> be stored in the CYMTCC clipboard; you will be able to retrieve it using the **Undo** command.

4.5 Copy

Stores a copy of the selected device in the clipboard. (Equivalent to pressing the CTRL and the C keys together or the CTRL and Insert keys together.) Use **Paste** (Section 4.6) to insert the device again elsewhere in the one-line diagram, or even in another opened study.

> **<u>Hint</u>**: You can make a copy of a device by selecting its symbol, holding down the CTRL key and dragging a copy of the symbol to another place in the one line.

4.6 Paste

Copies the selected device (symbol and curve) from the clipboard to the active study. (Equivalent to pressing CTRL and V keys together or the Shift and Insert keys together.) You may **Paste** the same device as many times as you like. See also **Cut** and **Copy**. Just click and drag the pasted symbols to the desired locations.

4.7 Delete

Removes the selected device from the study, whether you select it from the One-Line Diagram or the Curve Plot. (You may also press the Delete key.)

> **<u>Note</u>**: The deleted device can be retrieved with the **Undo** command.

4.8 Select All

Select all the devices in the CYMTCC. (Equivalent to pressing the CTRL and A keys together.)

> **<u>Hint</u>**: You can select symbols by holding down the CTRL key, while left-clicking on each device you want.

4.9 Device Properties

Displays the dialog box for the settings of the selected device, so that you may view and edit them. For more information on device settings and the **Device Properties** dialog box, please refer to Chapter 5 The Create Menu.

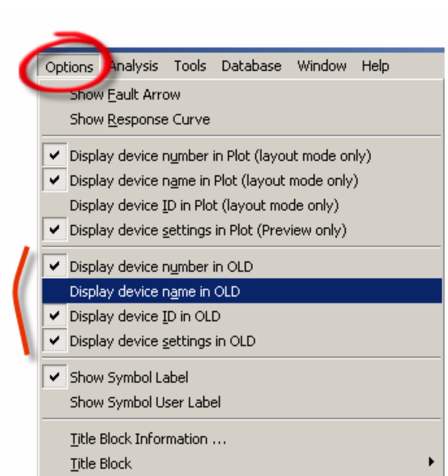
The **Device Properties** dialog box is displayed when you select the **Edit** > **Device Properties** menu command, via the Modify icon, or by simply double-clicking on the selected device.

4.10 Symbol Properties

The **Edit** > **Symbol Properties** menu command displays the **Symbol Properties** dialog box for a selected device. From this dialog box, you can edit the selected one line symbol itself (line thickness, color, etc.).

You can also access this dialog box by selecting a component, and clicking on the **Symbol Properties** button in the Main toolbar, or by right-clicking to access the contextual menu, and from it, select **Symbol Properties**.

Up to five tabs will be displayed in the Symbol Properties dialog box. The number of tabs depends on the display options that are selected from the **Options** menu.



The number of tabs displayed will also depend on the type of component (i.e., for a device symbol, the five tabs will be displayed, for a line, only the Line and the Position and Size tabs will be displayed, etc.). The functions enabled in this dialog box depend on the type of symbol selected.

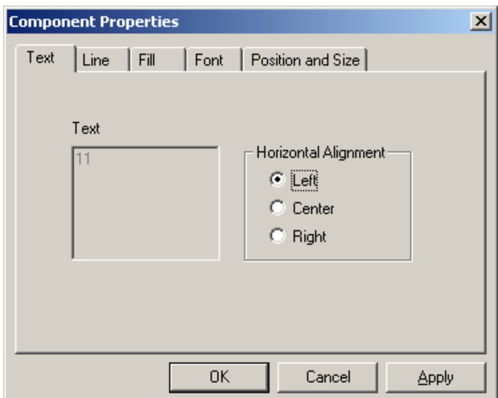
- The **Text** tab lets you see the Symbol Label and align it.
- The **Line** tab to define how the lines appear in the component selected. You can set color, style and width.
- The **Fill** tab to define how the component is filled. The most commonly used fill is a solid fill, which is a foreground color with no hatching. You can also choose a hatched fill pattern with a background color.

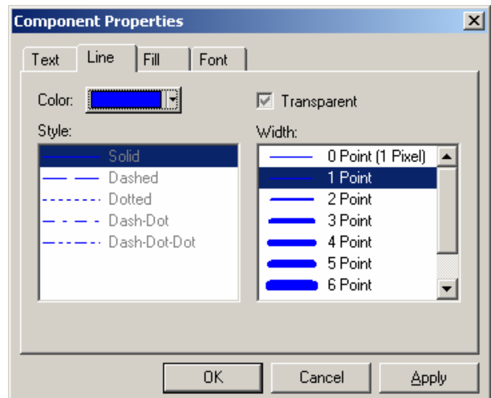
- The **Font** tab to define how the text appears in a component. You can choose any True Type font and then apply any typographical effects such as italic or underline. Only True Type fonts are available since True Type fonts are the only fonts that support rotation.

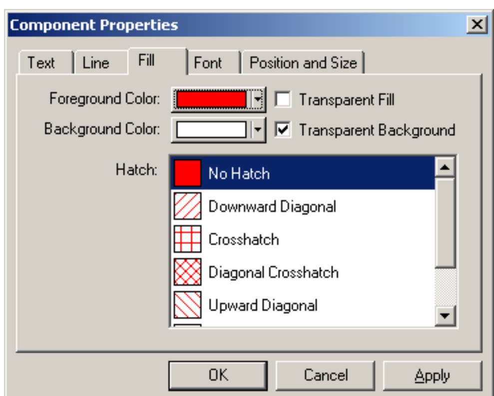
- The **Position and Size** tab provides the information about the position of the symbol in the drawing and its size.

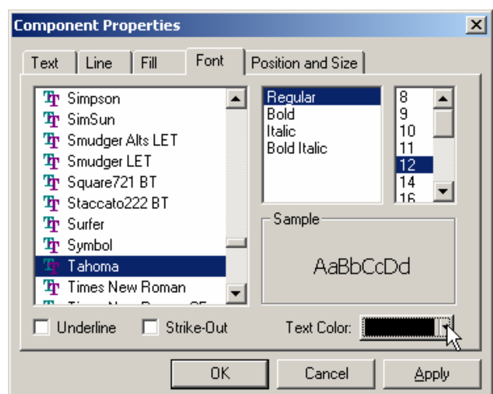
Hint:	Set the default properties for the symbols via **File > Preferences** > **Colors** options (Section 3.10.3)

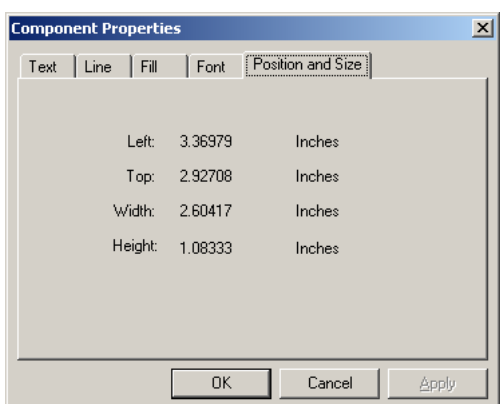
The **Apply** button applies the changes leaving the dialog box open on the window, while clicking **OK** will apply the changes and close the dialog box.











4.11 Hidden

This command removes the curve of the selected devices in the One Line Diagram from the Curve Plot. The device symbol remains on the One-line diagram. Use this command for clarity if the Curve Plot becomes crowded.

To hide a curve, click on it or click on the corresponding symbol in the one-line diagram or select it from the **Device** list drop down in the main menu, and then select **Edit** > **Hidden**, or click the **Hide** button in the Main Toolbar.

You can hide more than one device at a time by making a multiple selection (by holding down the SHIFT key on your keyboard and clicking on the symbols in the one line diagram).

The **Hide** button in the Main Toolbar and in the Edit menu lights up when you hide a device curve or when you select a device whose curve has been hidden. To re-display the curve, select the symbol on the one-line and select **Edit** > **Hidden** or click on the **Hide** button. You can select multiple devices (Shift-Left click) and click the **Hide** button to hide or show multiple curves at the same time.

Note: A device curve may be hidden if CYMTCC cannot display it because:

- You have changed the type name of the device or curve in the device library and you open a study that refers to it by the original name.

Or

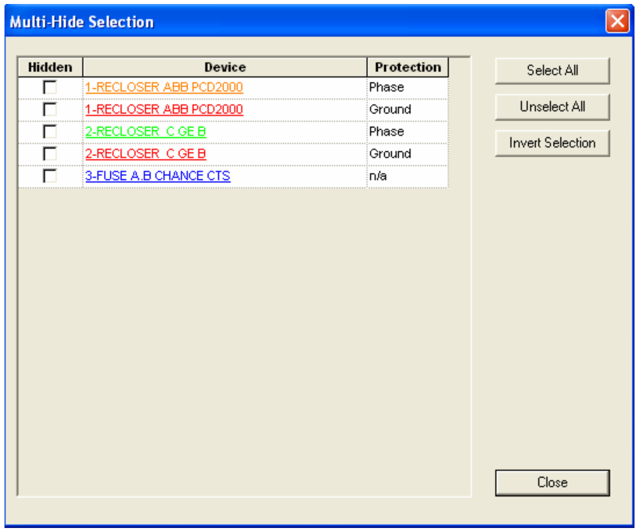
- You have imported devices from the CYMDIST or PSAF programs and those devices do not yet have any settings defined for them.

4.12 Multi-Hide Selection

The **Multi-Hide Selection** option facilitates the task of hiding and showing curves on the plot, and to easily view a list of the curves that are hidden.

To display the **Multi-Hide Selection** dialog box, select the **Edit > Multi-Hide Selection** menu item, or click on the **Multi-Hide** button in the **Main Toolbar** (see 1.6.3).

To hide a curve in the plot, enable the checkbox that appears to the left of its name in the **Device** list. You can use the command buttons located to the right of the dialog box to make multiple selections.



Each of the device names that appear in the list are of the same color than their corresponding curve on the plot. Click on a name in the list to edit it.

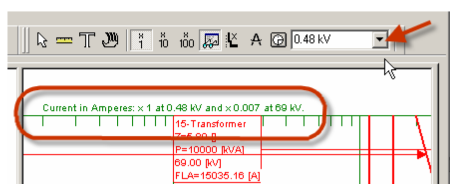
This feature is useful when using the **Device Margin** option to hide ground and phase curves.

The **Coordination Analysis** reports are automatically refreshed when a selection is changed. The **View > Do not show hidden devices** in reports has to be enabled to allow this.

4.13 Amps Multiplier

Displays, at the top of the Curve Plot, the current scale multipliers for every voltage level represented in the study. (Example: "x10 at 12.47 kV and x259.792 at 0.48 kV".)

If this command is not active, then only the current scale multiplier appropriate to the Plotting Voltage (like in the Plot Toolbar) is shown. (Example: "x10 at 12.47 kV").



You know that this command is active when a dot appears on the left of the menu command.

4.14 Clipboard

4.14.1 Paste to Plot

Superimposes on the Curve Plot the information stored in the Windows clipboard as a graphic. You can use this feature to paste a company title block or an image such as logo.

- You can **move the graphic** from its initial location by clicking on it and dragging it.
- You may **change the dimensions of the graphic** by clicking on it to display the "handles" (little squares around the edges). Click on a handle, hold the button down and move the mouse. Release the mouse button when the dimension is appropriate.
- Click outside the graphic to make the "handles" disappear.
- To **delete a graphic**, click on it to make the "handles" appear, and then select **Edit > Cut**, or press the Delete key.
- You can paste as many graphics as you like.

Note: Use the Graphic manager to keep track of the graphics you most often use. (See **Tools > Graphic Manager**, section 12.4).

You can also right click the the plot and select Edit>Copy/Pate to plot from the popup contextual menu.

4.14.2 Copy Plot

Copies the complete Curve Plot drawing to the Windows clipboard. You can then paste the image into another application, such as a word processor document.

Note: If the values identifying the x axis are not aligned correctly or the time in seconds is not centered on the y axis, you will have to change the orientation factor in the *Cymtcc.ini* file. This applies only when the scale is in full mode and/or the Y axis (Time in seconds). Depending on the software you paste your graphic to, the font rotation is not handled the same way.

To make this modification, go to **START>Run** and type "Cymtcc.ini" in the **Open** text edit box then click **OK**. This will open the *Cymtcc.ini* file in your default text editor. See below the two different solutions you can use. Simply change the numbers of the "TimeInSecondsAngle" and "CurrentAngle" to either 900 or 2700.

```
[GridLegend]
TimeinsecondsY=8.1000
TimeinsecondsAngle=2700
TimeinsecondsX=50
CyclesX=50
CyclesY=4.7000
CurrentAngle=2700
```

```
[GridLegend]
TimeinsecondsY=8.1000
TimeinsecondsAngle=900
TimeinsecondsX=50
CyclesX=50
CyclesY=4.7000
CurrentAngle=900
```

4.14.3 Paste to Diagram

Superimposes on the One line Diagram the information stored in the Windows clipboard as a graphic. You can use this feature to paste text from another application, a company title block or an image such as logo.

> **Note**: Only ONE graphic may be pasted on the one line diagram. The full surface of the graphic is opaque.

You can **move the graphic** from its initial location by clicking on it and dragging it.

You may **change the dimensions of the graphic** by clicking on it to display the "handles" (little squares around the edges). Click on a handle, hold the button down and move the mouse. Release the mouse button when the dimension is appropriate.

Click outside the graphic to make the "handles" disappear.

To **delete a graphic**, click on it to make the "handles" appear, and then select **Edit > Cut**, or press the Delete key.

4.14.4 Copy Diagram

Copies the complete One Line Diagram drawing to the Windows clipboard. You can then paste the image into another application, such as a word processor document.

Chapter 5 The Create Menu

5.1 Device Creation

The **Create** command allows you to add devices to the active study. The device symbol will be connected automatically to the device that is currently selected. If there is no device in the study, then the new symbol simply appears in the One Line window.

An alternate way to create a device in a CYMTCC study is to double click or drag and drop a device from the Multi Explorer (see 6.7) into the One Line window. This way, you can more easily connect the symbol to another symbol already in the One Line.

In either case, the **Settings** dialog box for that device type will appear. Select the specific device from the list available in the dialog box. Then define the settings, including color and line thickness, as desired.

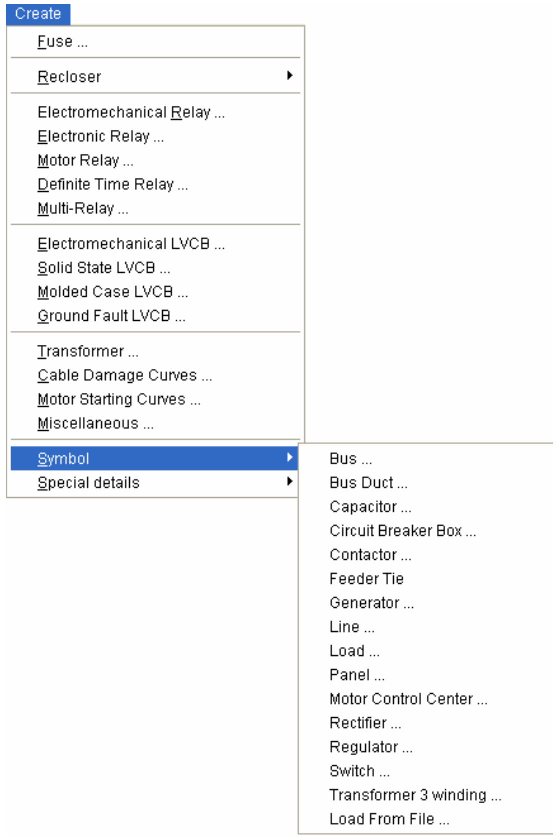
When you click on the **Draw** button in the dialog box, the time-current curve will appear on the Log-Log grid and the device symbol will appear in the One-line diagram. The new device is included in the Main Toolbar (see 1.6.3) device list and it becomes the selected device.

5.2 Create Menu

The **Create** menu allows you to add devices to a study. When a device is created,

- Its time-current curve is displayed on the Curve Plot.
- Its symbol is added to the One-line diagram, upstream of the present selected device.
- It is included in the Device List of the Main Toolbar.
- Its settings are displayed in the Status Bar at the bottom of the screen.
- It becomes the selected device.

As illustrated below, the **Create** menu lists all the devices and symbols that may be included in the Curve Plot and in the One-line Diagram.



To select an item to add, simply click on it in the menu. Creating a Symbol affects only the One-line diagram. Creating a protective device affects both the Curve Plot and the One-line.

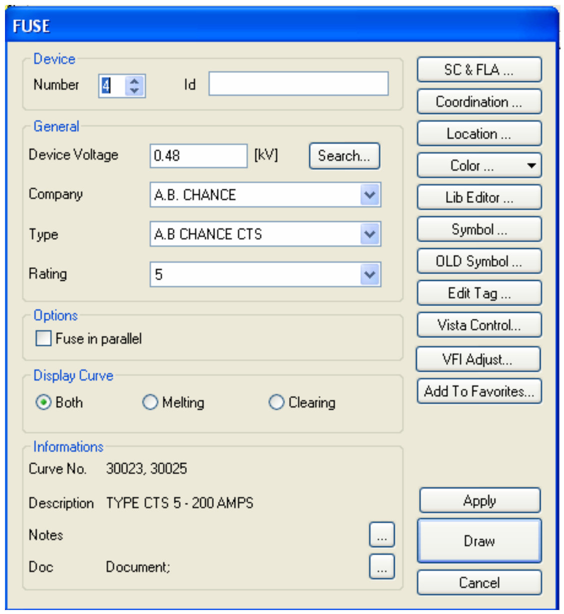
5.3 Common Window Elements and Commands

When you create a device, a dialog box appears so that you may define the **device settings**. Each device dialog box includes at least the following features:

- Device Number
- Device ID
- Device Voltage
- Search
- SC&FLA: Short Circuit and Full Load Amps
- Location: description of the physical location of the Device
- Coordination
- Color: Curve and Symbol color and style.
- Lib Editor: Editing the device curve (exceptions: motors and transformers)
- Symbol: One Line Diagram Symbol Label
- OLD Symbol
- Edit Tag
- Add to Favorites
- Apply
- Draw

- Cancel
- Information
    - Curve No.
    - Description
    - Notes
    - Doc

These common features are explained in this subsection of the reference manual, to avoid repetition. The next subsections of this chapter will detail the features and functions that are specific to each type of equipment that can be created.



<u>Note</u>: You will be able to access and edit the device settings window of any device by double-clicking on its symbol on the One-Line Diagram or on its curve on the Plot. Alternately, you can select the device and then select **Edit > Device Properties** to access the **Device Setting**s dialog box. You can also right-click on the device and select **Equipment Properties** from the contextual menu. Clicking on the **Device Properties** button in the Main Toolbar with the device selected will have the same effect (see 1.6.3).

5.3.1 Device Number

To assign a number to the device for identification purposes. This number can be displayed in the One Line diagram next to the device symbol (Section 8.9 Display Device Number in OLD) and in the tag in the Curve Plot (Section 8.5 Display Device Number in Plot).

Each time you add a device to the study, the lowest available number will be assigned to it by default. If you delete a device, the numbers assigned to other devices do not change. These numbers do not necessarily indicate a sequence of devices. You can change that using the functions found under the Coordination Tab of the Multi-Explorer Pane (See section 16.5).

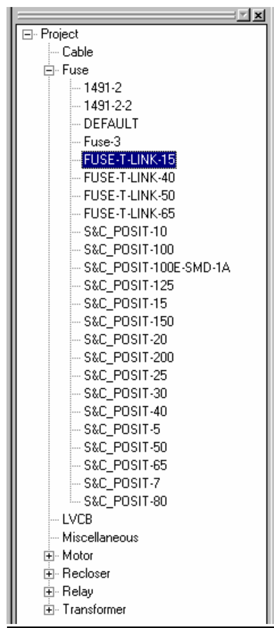
5.3.2 Device ID

This function allows you to assign some identification name to the device.

Hint:	You can create standard device settings in the Device Settings Tab of the Multi-Explorer, where each standard device will be listed by its Device ID. (See section 16.3)

Once entered, the Device ID will appear:

- in the Summary Report (Section 9.3 Summary (Tabular)).
- in the Device Identification Tag if you wish (Section 8.7 Display Device ID in plot).
- on the One Line Diagram if you wish (Section 8.11 Display Device ID in OLD).
- on the Protective Device Report, Loading + Reach reports. See 10.1 Protective Device Analysis (the first two check boxes).



5.3.3 Device Voltage

Is the Line to Line voltage (in kV) at the device location.

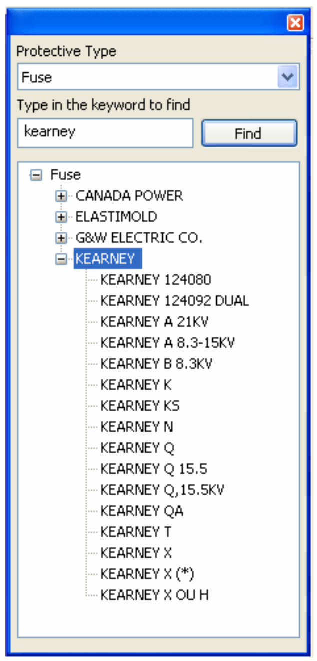
5.3.4 Search

The **Search** option allows you to search through the database for a specific keyword.

This search option works the same way as the Device Search Tab in the Multi-explorer pane except that it filters the protective type to the current device (see 16.4).

In some cases, the Protection type can be changed. For example, for the fuse, you can choose to search for rating value.

By double clicking on the type name in the result box, the company and type will automatically change.

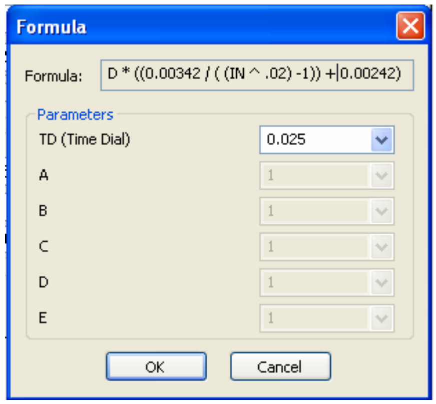


5.3.5 Param

If the selected curve (Type) is based on a mathematical formula, this button will be enabled. Click on it to modify the time dial value. If other parameters are required, the necessary fields will be available.

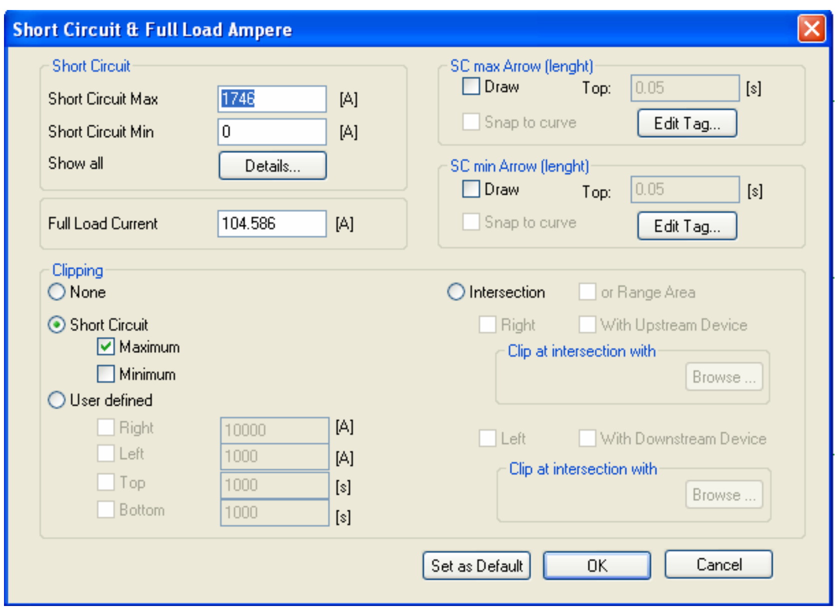
The formula is displayed at the top of the dialog box.

Note : When the device type is a relay, the time dial can be changed using the time dial field located in the **General** group box.



5.3.6 Short Circuit & Full Load Amperes

When you click on the **SC & FLA** button, the **Short Circuit & Full Load Amperes** dialog box is displayed.



In the **Short Circuit** group box, you can enter the **maximum** and **minimum** values of the **short circuit current** available at the device location, in Amperes. (If your study is made by importing devices from the CYMDIST or PSAF programs, the fault currents and load current will be the ones provided by those programs.)

The **Details** button will display a dialog box that will allow you to enter the LL, LLL, LG and the LLG short-circuit values.

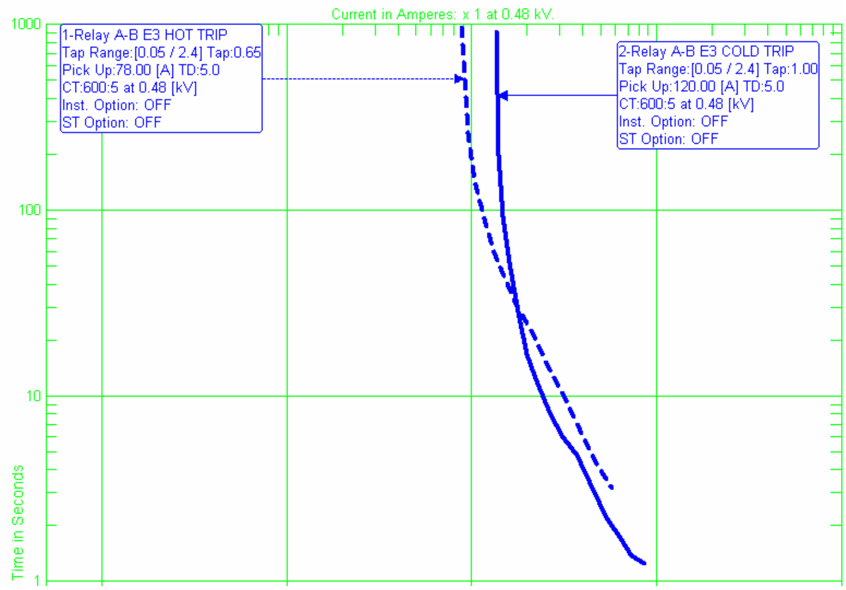
The **Draw Arrow** group box displays vertical arrows at the minimum and maximum short-circuit currents if you activate both the **Draw Arrow (Min and/or Max)** options AND **Options > Show Fault Arrow** (Section 8.1). Specify the height (**Top**) of each arrow by entering a time (Y-axis) value.

Note:	An arrow will not be drawn for a current of 0 A.

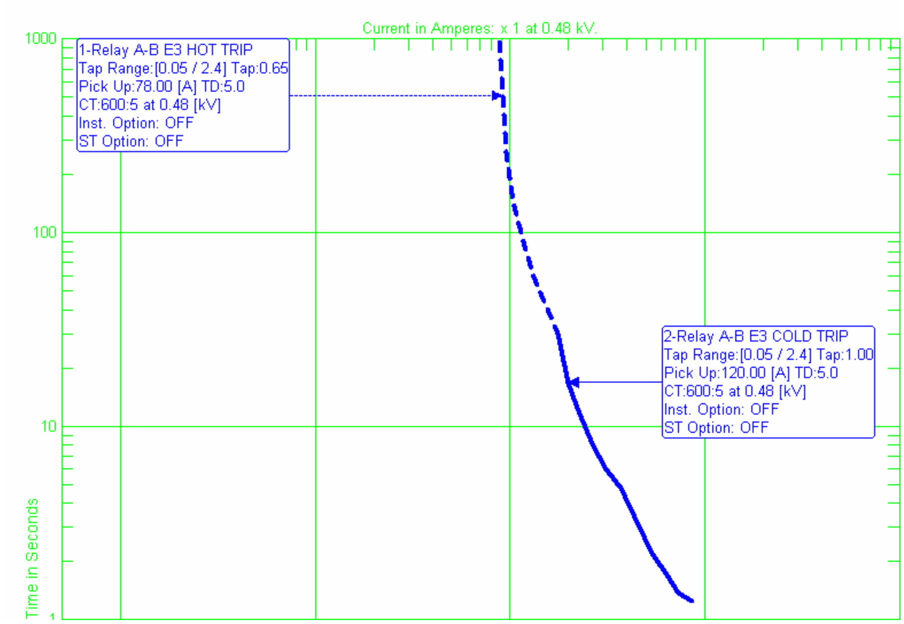
In the **Clipping** group box, you can set the upper current limit beyond which the device curve will not be drawn. Choose **Short Circuit** to use the maximum short circuit current as this limit, or set your own limit with **User defined**. Choose **None** to display the entire curve.

This **Intersection** option is mostly used with the **Multi-function Relay**. It is important to note that if you are using it in another situation, it might affect the validity of the coordination or the protection analysis.

- **Options: Intersection + With Upstream/Downstream Device –** Allows you to clip the curve on the right or on the left at the intersection point of the upstream or the downstream device.
- **Options: Intersection + Right/Left –** To clip the curve on the right or on the left at the intersection point of the selected device. Click the **Browse** button to select the device of your choice.
- **Option: or Range Area –** Same as above except that no intersections are required. The curve will be clipped where the curves cover the same range on the Amp axis (x).

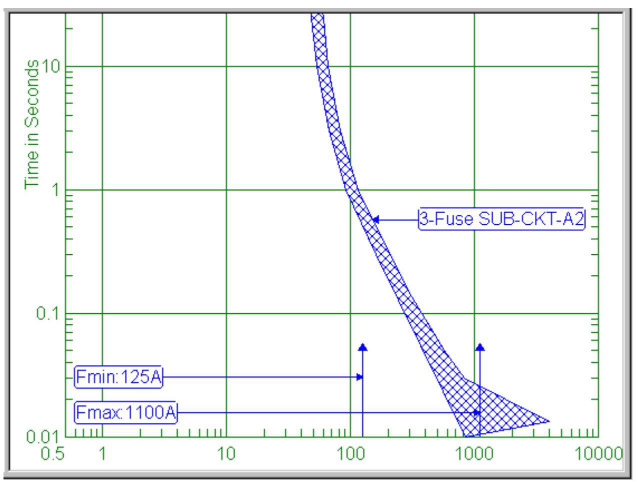


At Intersection: before



At Intersection: After

Note:	Use **Clipping** to prevent the curve from extending unnecessarily beyond the maximum short-circuit current available at the device, thus avoiding clutter (of the tags for example) in other parts of the curve.

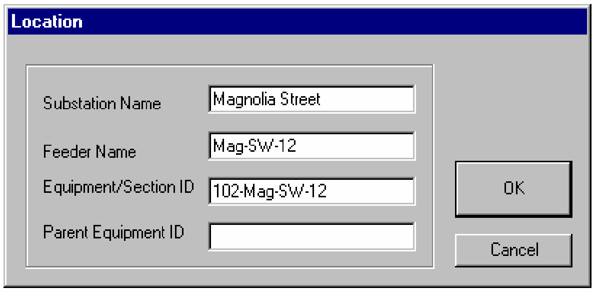


Fault arrows shown, but no clipping

Finally, the **Full Load Current** will be compared to the **Load criteria** (see section 10.5 Reach and Load Criteria). It is not shown on the Curve Plot, unless you add it to the device tag (See section 3.10.5 Tags Customization).

5.3.7 Location

You can identify the particular piece of equipment in the real circuit in the Location dialog box. If the device was imported from a CYMDIST study, this information would be filled in automatically.

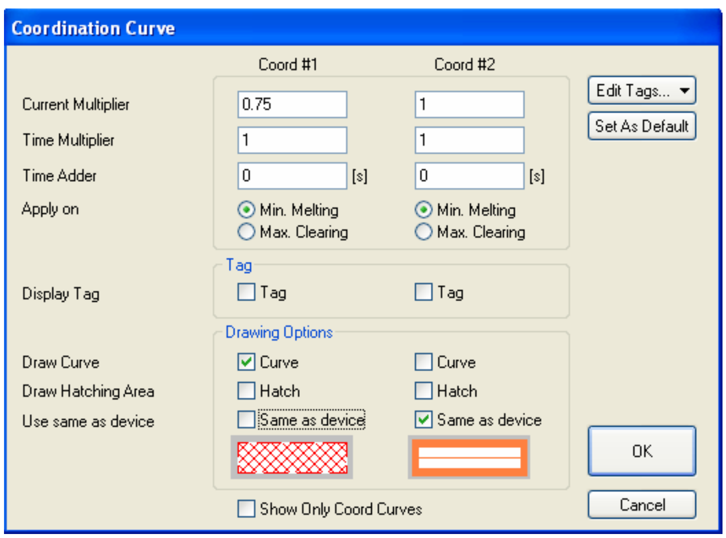


The **Parent Equipment ID** is the Device ID of the protective device immediately upstream in the circuit. You can build your own hierarchy of devices by typing in here the Device ID of the desired Parent Equipment.

5.3.8 Coordination

This function allows you to account for variations in the device's operating characteristics by displaying one or two additional curves.

The example shown below displays a copy of the minimum melting curve that has been adjusted downward in time by 25% on the Coordination Curve #1. This adjustment may represent the increased sensitivity ("fatigue") of the device caused by the passage of previous through-fault or inrush currents, and due to operation at a high temperature.



1. Type in the factor(s) in the field(s), (Current Multiplier, Time Multiplier and Time Adder).

2. Choose which of the two curves is to be adjusted. In the example above, we see **Min Melting** and **Max. Clearing**. Depending on the device type selected, the text will change to represent the curve name.

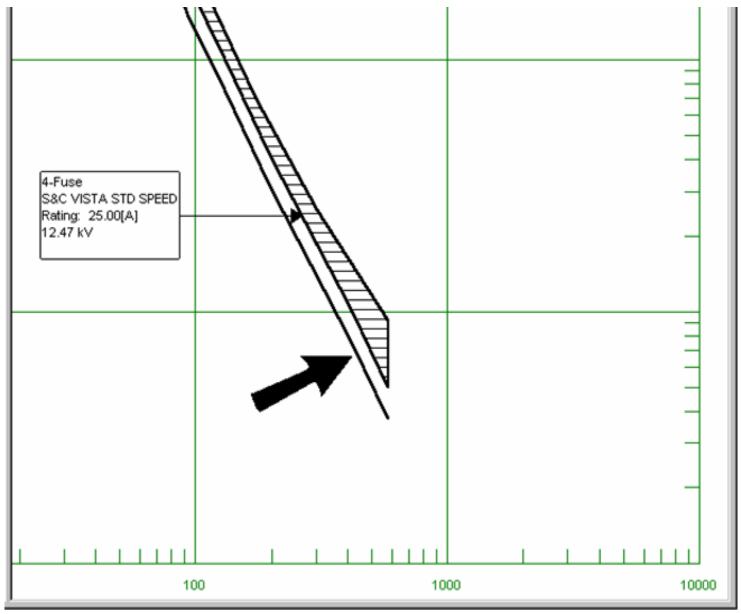
3. In the **Display Tag** option, select if you want to display a tag that will point to the coordination curve.

4. In the **Drawing Options** group box, enable the **Curve** and/or **Hatch** checkboxes to select the type of curve(s) you would like to see. Also, you have the possibility to draw the coordination curve the same color as the device by checking **Same color as device** or if you unchecked the box, click on the color box right below to specify a different color.

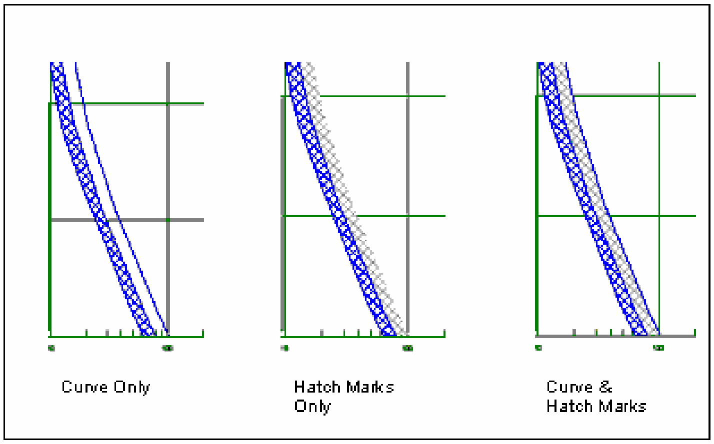
5. **Show Only coord Curves** will hide the device curve and only display the coordination curve if the box next to it is checked.

6. **Edit Tag** allows you to modify the tag text of the coordination curve #1 and #2. Select the tag to edit from the drop down list showing when the button is clicked.

7. If you click the **Set as Default** button, the coordination drawing options will be set as currently selected every time you enter the coordination option of a new device. The Coordination curve #1 and #2 are saved separately.



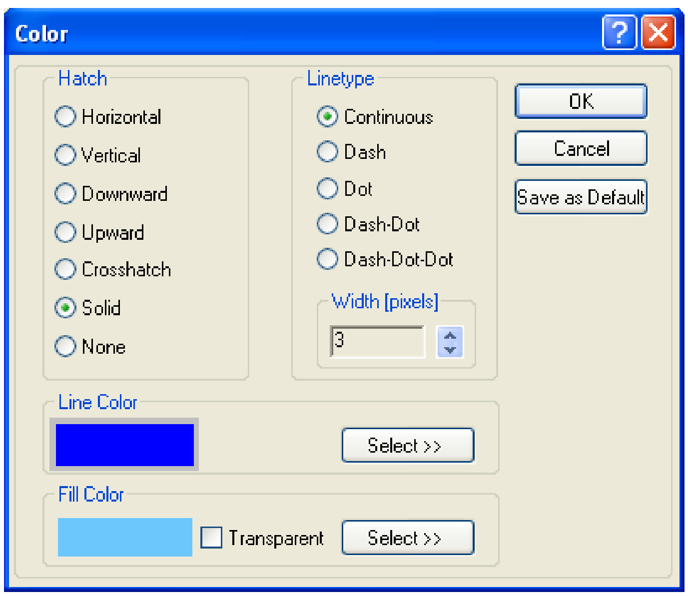
Copy of Minimum Melt curve adjusted for fatigue



Note:	Even if you do not place the check mark, CYMTCC will retain the adjustments in memory.

5.3.9 Colors

The appearance of the device curve is indicated in the **Colors** dialog box. You may modify the parameters:



- Choose the line type and hatch pattern by clicking on the desired style.
- Adjust the line thickness by clicking on the up/down arrows under **Width [pixels]**.
- Change the color by clicking on the **Select >>** button. A dialog box will display the colors available. Click on a color and click **OK**.
- If you click on the **Set as Default** button, options selected will be saved on your computer.

These choices apply to the particular device only. To make them apply to every subsequent device by default, use **File > Preferences > Colors** (Section 3.10.3 Colors).

5.3.10 Lib Editor

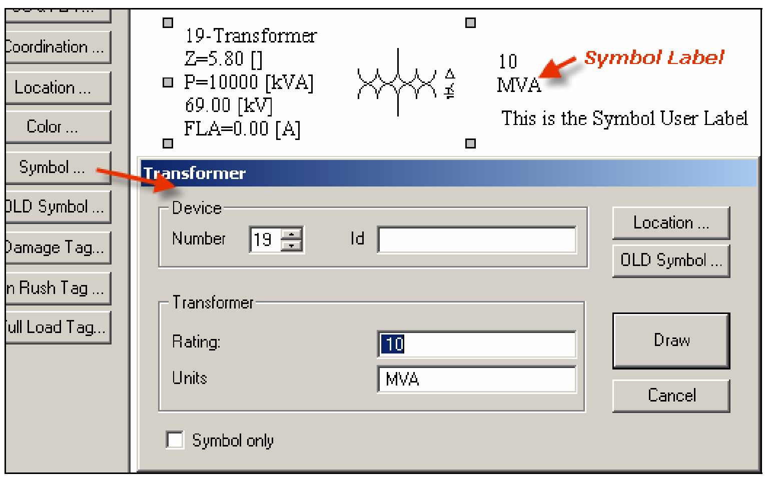
The **Lib Editor** button appears in the dialog boxes of those devices whose characteristic curves are stored in the Device Library. It activates the **Library Editor** (See section 13.3), which permits you to modify the curve description stored in the database.

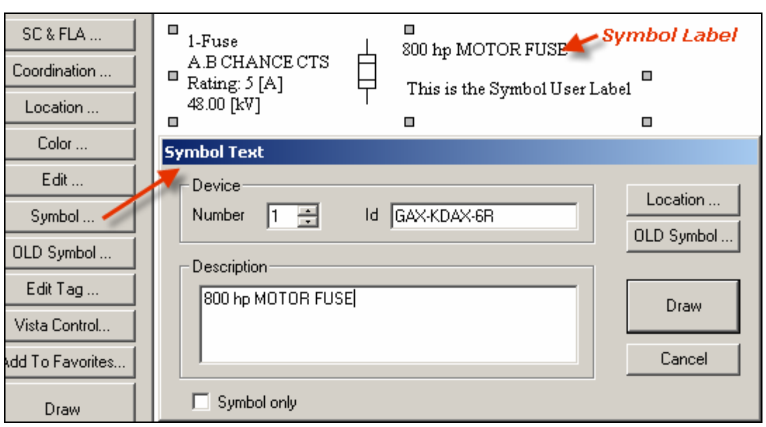
5.3.11 Symbol

This feature is used to provide a short description of your device. This description will appear next to the device symbol (top right) in the One Line Diagram when if you select the **Options > Show Symbol Label** menu item to activate it (Section 8.13).

For certain types of devices, the description elements are part of the symbol and can be edited; see the first dialog box below. For other types, you will need to enter that description; see the second dialog box below.

If you activate the **Symbol only** checkbox, the program will display only the symbol of that device and the corresponding curve will be removed from the plot. The program retains the information related to the device, so if you want to re-display the curve or the symbol data, you need only to remove the check in that checkbox.





The **Location** button on this dialog box has the same function than the Location button of the main **Device settings** dialog box. The **OLD Symbol** button has the same effect than the main **OLD Symbol** button (see below).

The **Draw** button will apply your changes to the diagram.

Note:	The **Symbol Label** is different from the **Symbol User Label** (see section 2.1.3 OLD Symbol Contextual Menu).

5.3.12 OLD Symbol

The **OLD Symbol** button displays the **Symbol Type** dialog box for you to select your symbol among the ones available for that specific device. (see 3.10.2 for more information).

5.3.13 Edit Tag

To edit the content of the device tag (See section 3.10.5 Tags Customization)

5.3.14 Add to Favorites…

To add the selected protection device to your list of favorites appearing under the **Favorites Tab** of the Multi-Explorer. You will need to create a directory first. (See section 16.7 for more information.)

The **Help > Video Help** menu comprises a file showing how to use the favorites (see 15.6).

5.3.15 Apply

Will do the same thing as the **Draw** button, except that the dialog box remains opened. This is useful if you want to adjust the device but you are not sure what settings to use.

5.3.16 Draw

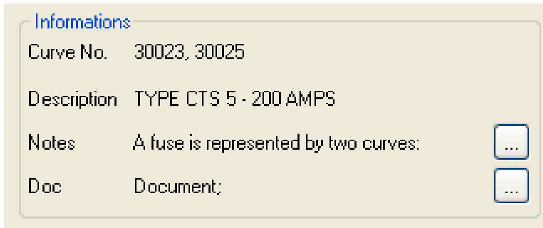
Clicking on the **Draw** button draws the curve.

5.3.17 Cancel

Closes the **Device settings** dialog box without applying changes.

5.3.18 Information

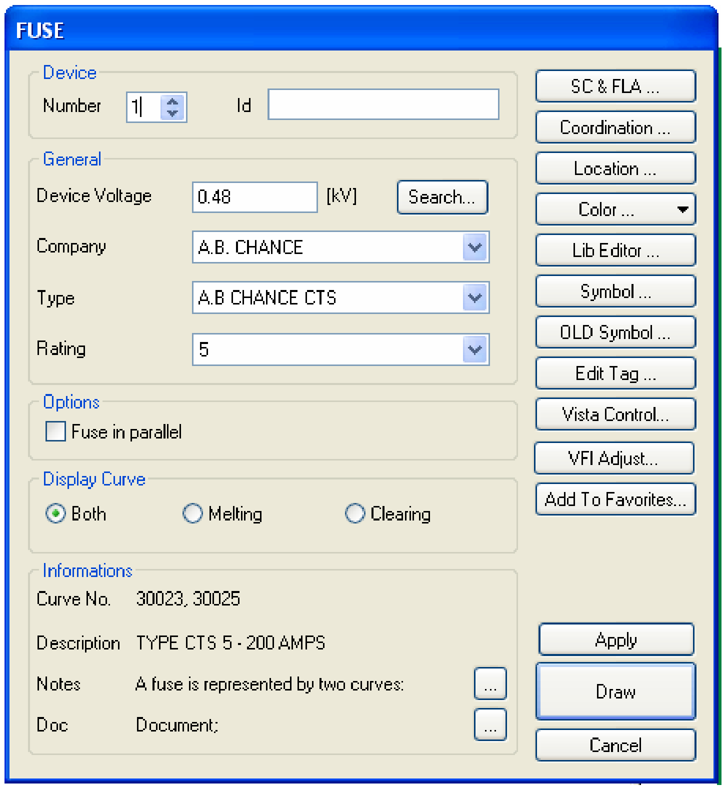
Gives extra information about the selected type. See below for a description of the four information fields.



Curve No.:	Is the number assigned to the curve by the manufacturer.
Description	Is a remark concerning the device.
Notes	This field shows some additional notes about the selected device. If the field is too small to show the entire text, click on the ... button and a message box will open showing the full text. The Notes can be added or modified by clicking the **Lib Editor** button. For more information see **Notes Field** (see17.4).
Doc	The **Doc** field (short for documentation) lets you know if documents related to the selected type are available. If so, a description of the available document will be displayed. Click on the ... button to open the **Documentation Tab** of the Library Editor to view, modify or add document. For more information see 17.3.

5.4 Fuse

Draws the curve(s) for a fuse, using the information entered through this dialog box. The **VFI Adjust** and the **Vista Control** buttons provide access to parameterization specific to that type of device. (see 5.4.2 and 5.4.1) For a description of the other functions, see section Common Window Elements and Commands in section 5.3).



In the **General** group box:

- **Company** identifies the manufacturer. Click on the symbol and then on the name.
- **Type** identifies the specific device. Click on the symbol and then on the device name.
- **Rating** identifies the size or rating. Click on the symbol and then on the rating.

In the **Options** group box, the **Fuse in Parallel** option will display the curve of two identical fuses of the selected type, connected together in parallel to function as one fuse.

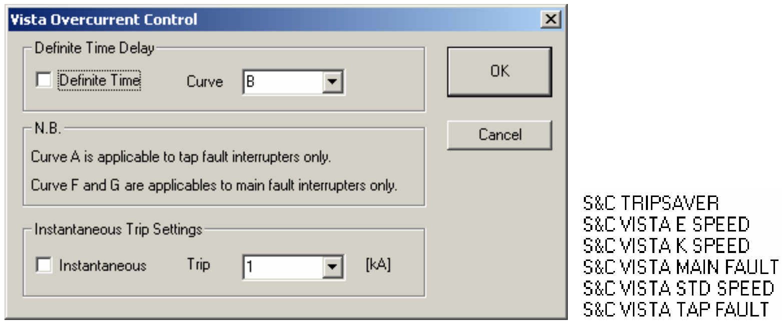
In the **Display Curve** group Box:

- **Both**: Displayed both the melting and the clearing curves on the Time/Current Plot.
- **Melting**: Only the Melting Curve will be draw.
- **Clearing**: Only the Clearing Curve will be draw.

The **Coordination** and the **Vista Control** buttons have specific behaviors for the fuse, as follows.

5.4.1 Vista Control

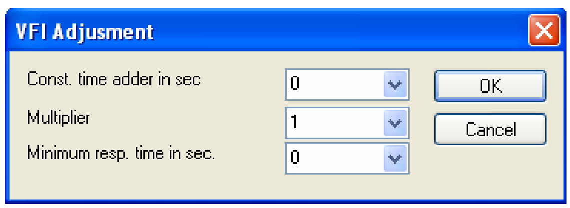
This option supports the Vista control specific to the S&C Vista fuses.



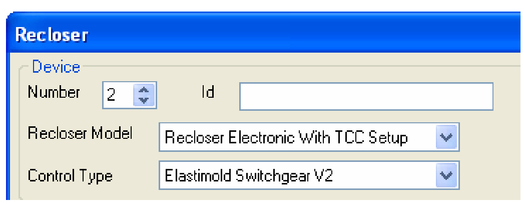
Click to activate the options and choose the setting(s). Click **OK**.

5.4.2 VFI Adjust

This option allows you to move the curve by using the constant time adder and multiplier. You can also specify a minimum response time in seconds.



Those three factors were added for compatibility with the Elastimold Switchgear Version 1. Please note that the Version 2 is also available in CYMTCC. The curves are modeled as a recloser with electronic TCC setup.

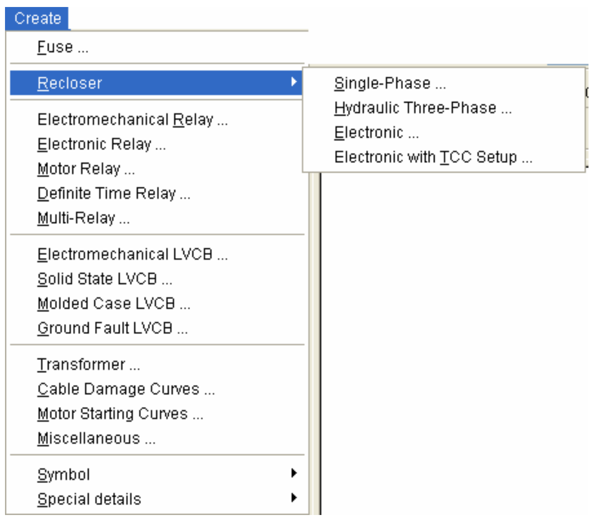


5.5 Recloser

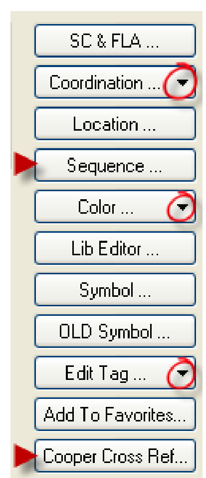
Reclosers are grouped by **Model type** into four groups each one having different **Control Types**. New control types can be added by using the **Library Editor > Views > Recloser Control Types** (see 13.3.1.3).

The Recloser Groups (including some of their control types) are:

- Electronic with TCC Setup (ABB PCD 2000, Cooper 4A, 4C, 5, 5/TS, 6, 6/TS, FX, FXA, FXB (Menu option: “Electronic with TCC Setup”).
- Electronic (Cooper 3A, GE, Lexington, Westinghouse (Menu options: “Electronic” and “Electronic Westinghouse”).
- Hydraulic single-phase (Electronic, Cooper hydraulic, Lexington hydraulic).
- Hydraulic 3-Phase.



When creating any recloser, the functions available on the settings dialog boxes will be as illustrated here.



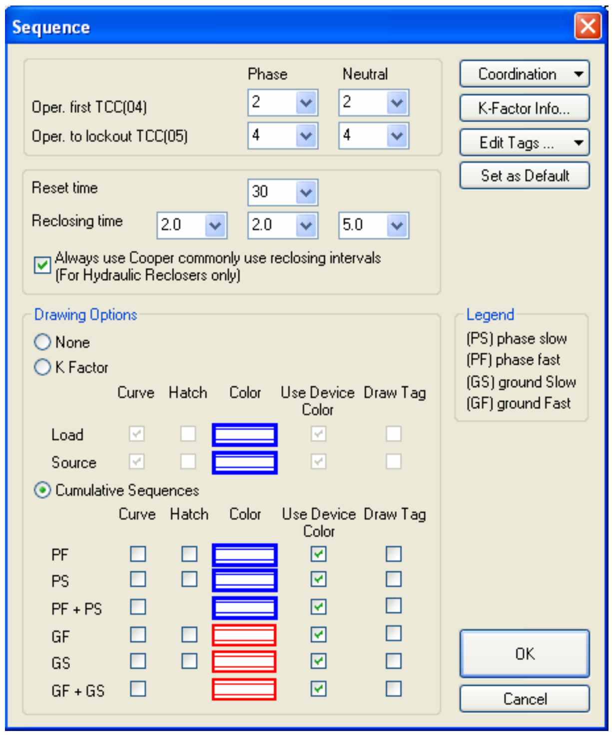
- **Coordination**: When clicking on this button, a drop down menu will appear. Select the coordination curve you would like to modify. See **Create > Common > Coordination** for more information (section 5.3.8).
- **Sequence**: This option allows you to enter the number of operations on the fast curves and the number of operations to lockout, and to specify the reset time and reclosing intervals. Also, you can generate curves based on this data (K-Factor and Cumulative. More functionalities described below) See **Create > Recloser > Sequence** (section 5.5.1) for more info.
- **Color**: When clicking on this button, a drop down menu will appear. Select the curve type for which you want to modify the color. See **Create > Common > Colors** (section 5.3.9) for more information.
- **Edit Tag:** When clicking on this button, a drop down menu will appear. Select the curve type for which you want to modify the tag. See **File > Preferences > Tags Customization** (section 3.10.5) for more information.
- **Cooper Cross reference**: View a cross-reference table of the two ways to label curves.

The other functionality available is as described at section 5.3 Common Window Elements and Commands, except for the **Coordination**, **Sequence**, **Color** and **Edit Tag** buttons.

Depending on the recloser selected some options in the drop down button menu will be activated or deactivated.

5.5.1 Sequence

Here the user can specify the number of operations on the fast curve(s), and the number of operations to lockout.

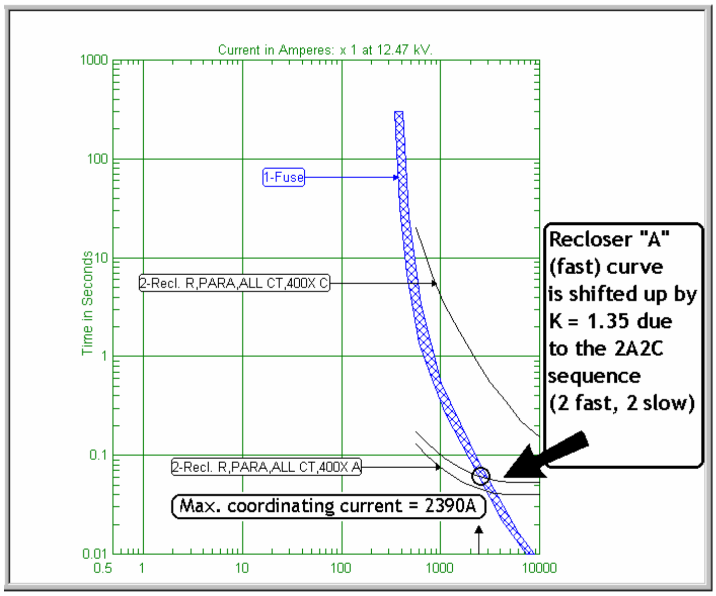


Oper. First TCC(04)	The number of operation(s) on the fast curve. (Phase and Ground)
Oper. To lockout TCC(05)	The total number of operations.
Reset Time	This value will be used when calculating the overtravel time of the relay. (See **Create > Relay > Overtravel**, section 5.6.2)
Reclosing Time	Those values will be used to generate the K-Factor curve(s). (See the table below)
Always Use Cooper intervals	The reset time and reclosing time will always default to the values recommended by Cooper. (For Hydraulic reclosers only)

Drawing Options	Based on the sequences entered, two types of curves can be drawn, the K-Factor and the Cumulatives Sequences. To draw the selected curve(s) enable the **Curve** and/or **Hatch** checkbox. It is also possible to specify a color different than the color of the device curve itself by un-checking the **use device color** checkbox and clicking the color box to select a different one. If a tag is required to identify the curve on the plot, the **Draw Tag** checkbox needs to be checked.
K-factor option	(refer to Cooper Power Systems Electrical Distribution System Protection): • If there is a fuse upstream of the recloser, choose **Draw Source-Side**. The time values of the recloser's "slow" curve are multiplied by the K-factor. See the table below. • If there is a fuse downstream of the recloser, choose **Draw Load Side**. The time values of the recloser's "fast" curve are multiplied by the K-factor. See the table below. • In both cases, the intersection of the modified curve and the minimum-melt curve of the fuse determines the maximum coordinating current.

Reclosing Time in cycles	Source-side 2 Fast, 2 Slow	Source-side 1 Fast, 3 Slow	Source-side 4 Slow		Load-side 1 Fast	Load-side 2 Fast
25	2.70	3.20	3.70		1.25	1.80
30	2.60	3.10	3.50		1.25	1.80
50	2.10	2.50	2.70			
60					1.25	1.35
90	1.85	2.10	2.20		1.25	1.35
120	1.70	1.80	1.90		1.25	1.35
240	1.40	1.40	1.45			
600	1.35	1.35	1.35			

K-factors from Cooper Electrical Distribution System Protection

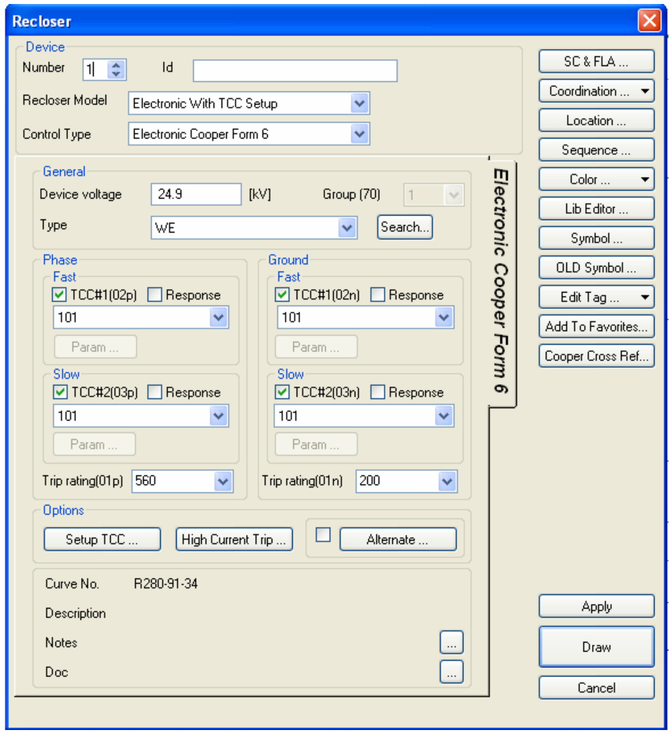


Application of "K" factor to load-side fuse coordination

Cumulative Sequences	This option generates a curve showing the total time for the complete open-close sequence for the fast curve (Fast curve x #operations) for both the phase and the ground curves. The same goes for the slow curves (Slow curve x #operations to lockout-Oper. first). It can also generate a curve based on the total number of operations on the fast and slow cumulative curves.
Coordination	Adds a coordination curve based on the K-Factor or Cumulative curves. Select the curve you would like to apply a coordination factor on from the drop down menu. (See **Create > Common > Coordination**, section 5.3.8)
K-Factor Info	Shows the K_Factor table from the *Cooper* *Electrical Distribution System Protection*
Edit Tag	Personalizes the tag that identifies the K-Factor and Cumulative curves. (See **File > Preferences > Tags Customization**, section 3.10.5, for more info).
Legend	Gives a full description of the wording used to describe the different curves in the cumulative drawing option.
Set As Default	The values entered will be saved on your computer. The next time you create a device, those options will use the values from the last time you pressed the **Set as Default** button.

5.5.2 Electronic with TCC Setup

This creation dialog box applies for the creation of electronic reclosers. This includes reclosers such as ABB PCD 2000, Cooper 4A, 4C, 5, 6, FX, FXA, FXB, and more.

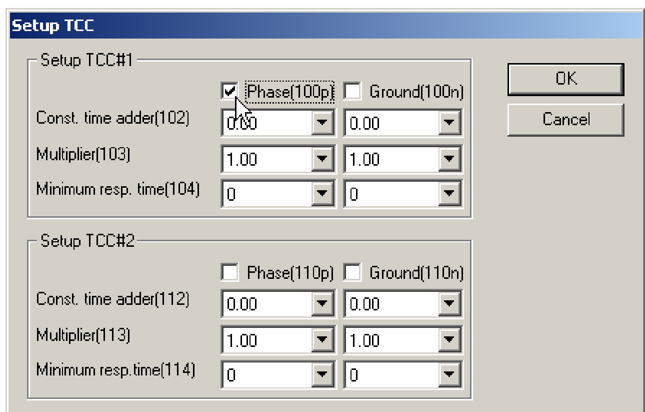


In the **General** group box you will be able to specify the characteristics of the recloser:

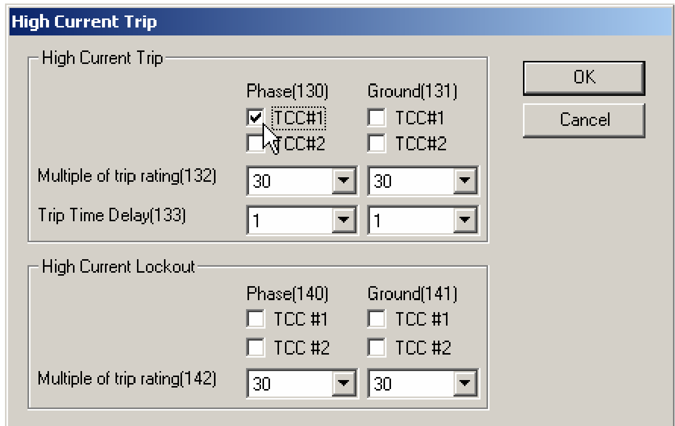
Type	Identifies the specific device. Select from the list by clicking on the ▼ symbol and then on the device name.
Group	Identifies the group of curves to be used. Select from the list by clicking on the ▼ symbol and then on the **Group**. This field is not used by all the control types. It is mostly used by the ones similar to the Cooper form 4C.
Phase and **Ground**	The **Phase** and the **Ground** group boxes allow you to adjust the phase and the ground curves that will displayed on the Curve Plot workspace: • **TCC#1** and **TCC#2** curves represent respectively the **'Fast'** and the **'Slow'** total clearing time of the **Phase** or the **Ground** trip units, including the interrupting time. To display the curve(s), click on the checkbox(es) marked **TCC#1** and **TCC#2** so as to place a check mark (☑). Then, for each (selected) one, click on the ▼ symbol, and then on the desired curve. The curves denominations are the ones from the manufacturers and are included in the CYMTCC Device Library. **Hint**: If you do not find a particular curve in the list, select another **Group** from the drop down list in the **General** group box.
Response	**Response** curve represents the reaction time of the control unit only. To display this curve, enable the **Response** checkbox (☑).

	Note: You must also activate **Options > Show Response Curve** (Section 8.2), so the curves will appear on the Curve Plot workspace.
Param	See **Create > Common > Param** (see 5.3.5).
Trip Rating	Is the pick-up current rating. The **Phase** and **Ground trip units** have separate ratings. A multiplier is applied to the rating to find the Pick Up current. You may type in the Trip rating (in Amperes) directly, or click on the ▼ symbol and select it from the list. **Note**: The numbers in parentheses next to items in the dialog box refer to codes used in the programming of the recloser. They are meant as a guide only.

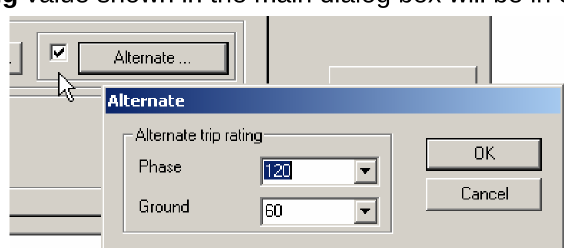
The **Options** group box regroups commands to allow adjusting the curves.

Setup TCC	Clicking on this button displays the following dialog box. You will be able to adjust the **TCC#1** (Fast) and **TCC#2** (Slow) curves of the **Phase** and/or **Ground** units. Click on the checkboxes next to each curve to be adjusted. 
Constant Time Adder	Is the time (in seconds) by which the curve will be shifted upwards.
Multiplier	Shifts the curve upwards if it is greater than 1.0, downwards if less than 1.0. (This is an alternative to the Constant Time Adder.)
Minimum Response Time	Introduces a lower time limit on the response curve. It is expressed in cycles, and applies to the response curve only.

<table>
<tr>
<td>High current trip</td>
<td>
You may click on the High current trip... button of the Options group box if the instantaneous tripping accessory is installed on the recloser. This will allow you to define the instantaneous trip current and delay for some or all of the curves. The following dialog box will appear. Enable the checkbox next to each affected curve, as shown below for TCC#1 of Phase (130).



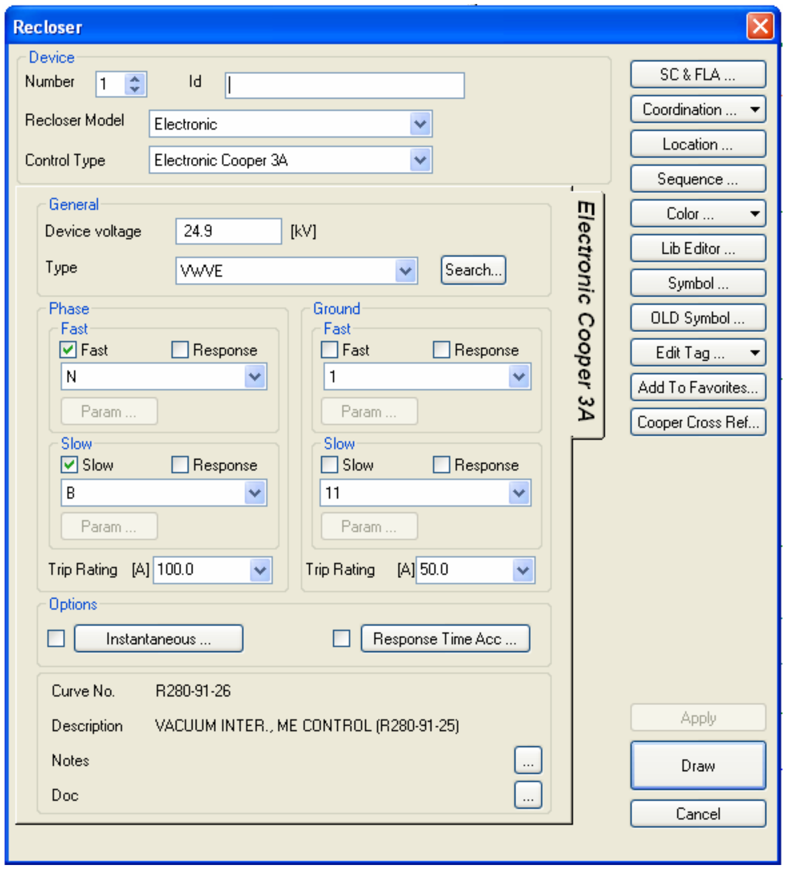
</td>
</tr>
<tr>
<td>Multiple of Trip Rating (132)</td>
<td>Defines the instantaneous trip current.</td>
</tr>
<tr>
<td>Trip Time Delay (133)</td>
<td>Is the instantaneous delay due to the control only. The instantaneous portion of the response curve will be horizontal at this time value.</td>
</tr>
<tr>
<td>High Current Lockout</td>
<td>Is the same as the High Current Trip but without the Trip Time delay. Defines the Multiple of Trip rating (142) only.</td>
</tr>
<tr>
<td>Alternate</td>
<td>
Finally, clicking on the Alternate button in the Options group box will allow you to enter an Alternate Trip Rating in this dialog box. It will be used in place of the rating shown in the main dialog box <u>only if the checkbox next to the Alternate button is activated</u>. Otherwise, the Trip Rating value shown in the main dialog box will be in effect.



</td>
</tr>
</table>

5.5.3 Electronic

This creation dialog box applies for the creation of standard electronic reclosers and of Westinghouse electronic reclosers. This includes reclosers such as Cooper 3A, GE, Lexington, Westinghouse. The **Create** > **Reclosers** sub-menu provides two options: Electronic and Electronic Westinghouse.

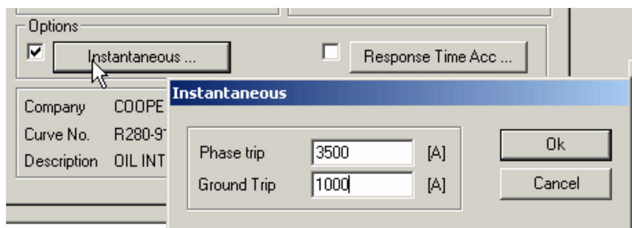
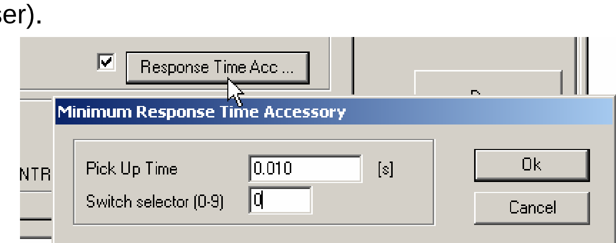


The **General** group box will allow you to specify the characteristics of the recloser:

Device Voltage	Is the Line-to-Line Voltage at the recloser location, in kV.
Type	Identifies the specific device. Select from the list by clicking on the ▼ symbol and then on the device name.
Phase and Ground	The **Phase** and the **Ground** group boxes allow you to adjust the phase and the ground curves that will displayed on the Curve Plot workspace.
Param	**Create > Common > Param** (see 5.3.5).
Trip Rating	Is the current rating. The **Phase** and **Ground** trip units have separate ratings. A multiplier is applied to the rating to find the Pick Up current. Type in the Trip rating (in Amperes) directly, or click on the ▼ symbol and select it from the list.

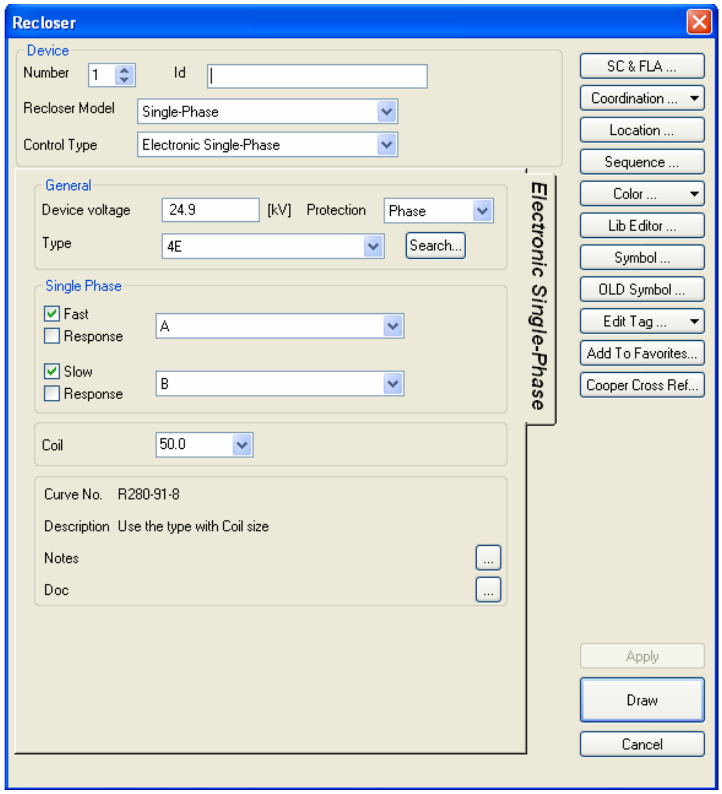
Fast and **Slow** curves	**Fast** and **Slow** curves represent respectively the **'Fast'** and the **'Slow'** total clearing time of the Phase or the Ground trip unit, including the interrupting time. To display the curve(s), activate the checkbox(es) marked **Fast** and/or **Slow** (☑). Then, for each selected one, click on the ▼ symbol and then on the desired curve.
Response curve	**Response** curve represents the reaction time of the control only (i.e., not including the interrupting time). To display this curve, enable the **Response** checkbox (☑). **<u>Note</u>**: You must also activate **Options > Show Response Curve** (Section 8.2), so the curves will appear on the Curve Plot workspace.

In the **Options** group box, you have two options. To access any of those, first activate the checkbox next to the button, and then click on the button to display the related dialog box.

Instantaneous...	To indicate that the **Instantaneous** accessory is installed on the recloser, enable the checkbox next to the button (☑). To set the accessory, click on the button itself. A dialog box will appear, in which you may enter the instantaneous trip current in Amperes for the **Phase** and the **Ground** units. Beyond the instantaneous trip current, the curve will be a horizontal line drawn at the interrupting time because there is no delay due to the control. 
Response Time Accessory	To indicate that the **Minimum Response Time** accessory is installed on the recloser, enable the checkbox next to this button (☑). To set the accessory, click on the button itself. A dialog box will appear, in which you may enter the minimum time for the response of the recloser controls. Any portion of the curve drawn below this minimum time will be replaced by a horizontal line at the minimum time. (The Switch Selector position, that you can specify here, is for information only.) Note that this option will not appear in the dialog box for the Westinghouse electronic recloser). 

5.5.4 Single-Phase

This creation dialog box applies for the creation of single-phase reclosers.



The **General** group box will allow you to specify the characteristics of the recloser:

Type	Identifies the specific device. Select from the list by clicking on the ▼ symbol and then on the device name.
Protection	Lets you choose if the device is installed on a Line-to-Line or a Line-to-Ground segment. Used only with the Coordination Analysis report. (See **Analysis > Protective Device Analysis > Coordination**, section 10.1)

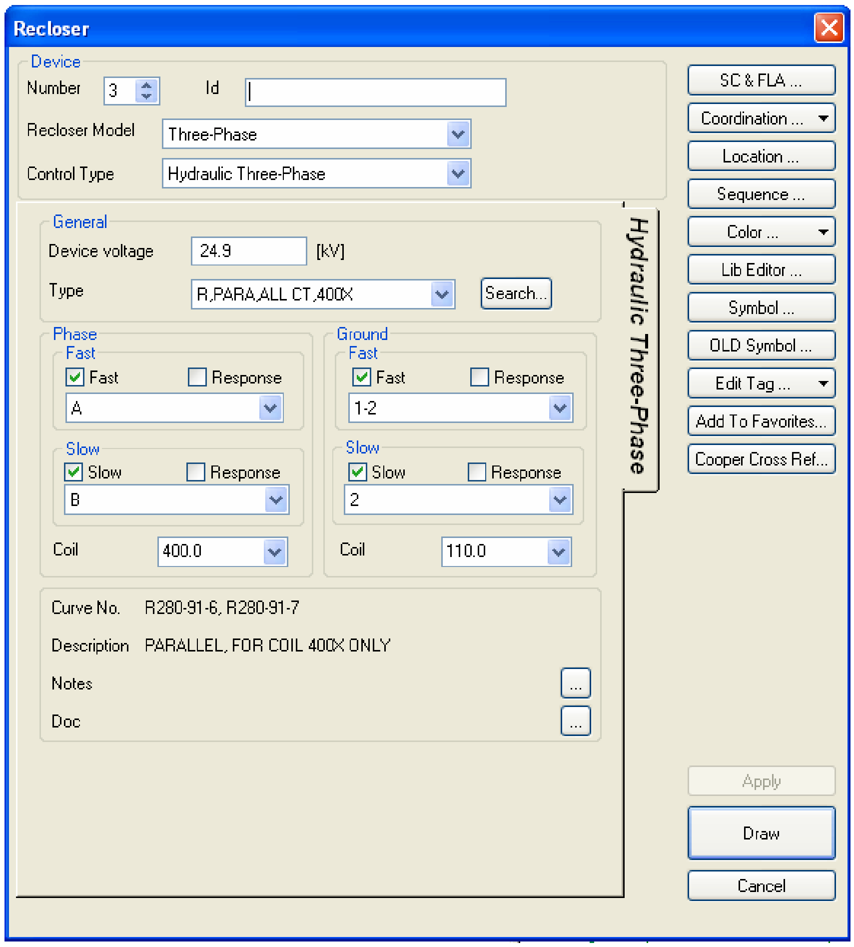
The **Single Phase** group box allows you to adjust the phase curves that will displayed on the Curve Plot workspace:

Fast and **Slow**	Represent respectively the 'Fast' and 'Slow' total clearing time of the recloser, including the interrupting time. To display the curve(s), enable the **Fast** and/or **Slow** checkbox(es) (☑). Next, for each one, click on the ▼ symbol and then on the desired curve.
Response	Represents the reaction time of the control unit only. To display this curve, enable the **Response** checkbox (☑). __Note__: You must also activate **Options > Show Response Curve** (Section 8.2), so the curves will appear on the Curve Plot workspace.

Finally, the **Coil** group box is to adjust the recloser current rating. A multiplier is (internally) applied to it to find the Pick Up current. Type in the coil rating (in Amperes) directly, or select it from the list by clicking on the symbol and then on the rating.

5.5.5 Three-Phase Hydraulic

This creation dialog box applies for the creation of three-phase reclosers. This includes reclosers such as the Cooper 3A and Joslyn PowerMax 100.



See explanations under **Single-Phase Recloser** (Section 5.5.4). The only difference is that the 3-Phase device adds similar settings for ground fault protection.

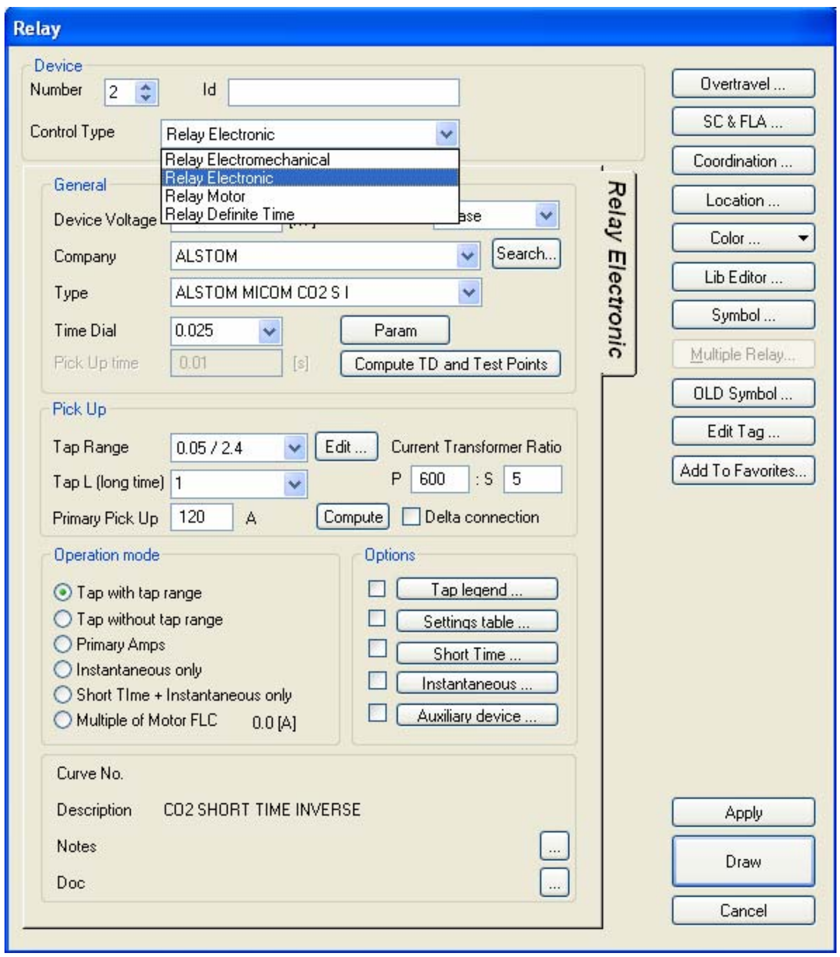
You may set different colors for the **phase** and **ground** protection curves.

5.6 Relay (All Types)

The CYMTCC application provides for the creation of various relays grouped in four categories. The common functionality is described in this section. You can also create Multiple Relays.

The dialog box shown below appears when any relay is to be created. You may change the **Control Type** by clicking as shown below.

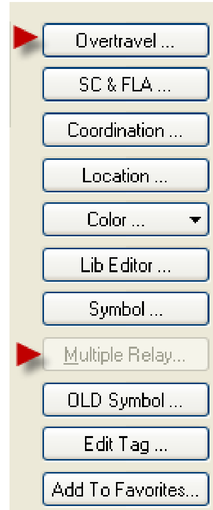
When creating any relays, the parameters available on the settings dialog boxes will be as illustrated here. (Note that some features do not apply to all relay categories). The Common Relay Creation Features are described below in section 5.6.1. The creation of a multiple relay will have one extra step, as described in 5.6.3 Multiple Relay below. Click on the **Draw** button to draw the curve.



The functionality available with the buttons is as described at section 5.3 Common Window Elements and Commands, except for the Overtravel and Multiple Relay buttons.

Overtravel, is described below in this subsection.

The Multiple Relay button will be active only for cases where a multiple relay have been created from the **Create** > **Multi-relay** menu option. See section 5.6.3 Multiple Relay below.

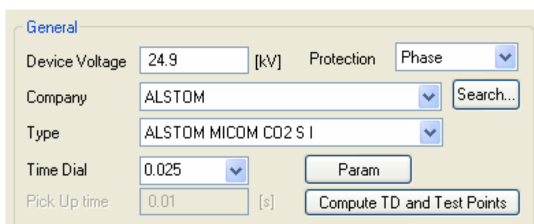


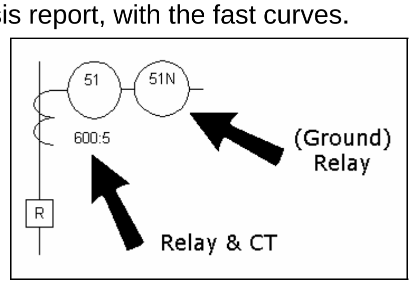
5.6.1 Common Relay Creation Features

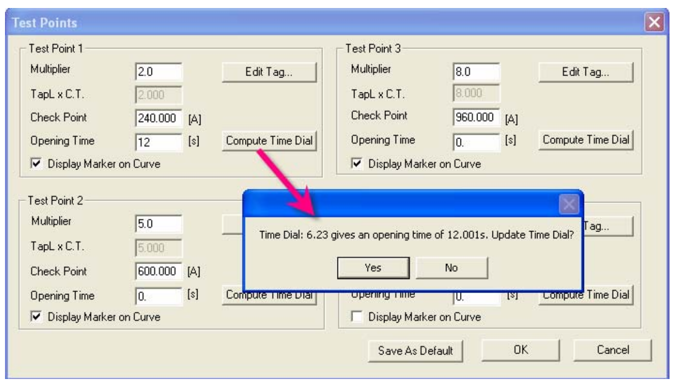
Device Group Box

Control Type	Select one of the four different types of relay.

General Group Box

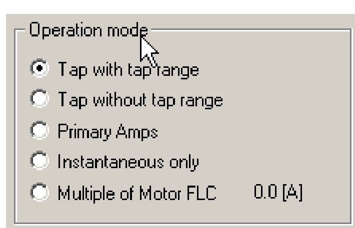


Protection	Allows you to set the relay for phase or ground protection, even as a second relay connected to the secondary of the phase protection relay's current transformers. You can also select Phase fast or Ground fast when you have a reclosers upstream and you would like to verify its coordination, using the analysis report, with the fast curves.  *51N denotes ground time-overcurrent relay*
Company	Identifies the manufacturer. Click on the symbol and then on the name.

Type	Identifies the specific device. Click on the ▼ symbol and then on the device name.
Time Dial	Is selected from a list by clicking on the ▼ symbol and then on the number. The choices listed here depend on the type of relay selected.
Pickup Time	This field is used only when the **Definite Time Relay** control type is selected. It defines the opening time of the device. The horizontal portion of the curve.
Compute Time Dial and Test Points	You can verify if a curve pass through one to four test points. Enter the current multiple and the desired time. Click on **Compute Time Dial** for CYMTCC to give you the time dial. Click **Yes** to accept it. If you have checked the **Display marke**r option in the **Test Points** dialog box, a circle will be drawn on the plot at the Opening time, Check Point value. You can also customize the tag related to that marker by clicking the **Edit tag** button. You can generate a XML report based on those four points. (See **Reports > XML Report > Test Points**. Refer to 9.2 XML Format Reports)  *Finding the Time Dial for the curve to pass through (240A; 12s)*

Operation Mode Group Box

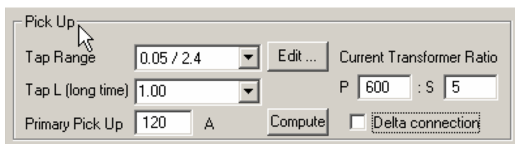
The **Operation mode** determines how to specify the value of the relay pick-up current. Select your operation mode <u>first</u>, before specifying the parameters of the **Pick Up** group box, by clicking on the name of the mode. This will enable the relevant fields in the **Pick Up** group box.



Tap with tap range	Will require setting a Tap Range, Tap, and Current Transformer ratio in the **Pick Up** group box fields.

Tap without tap range	Will require setting only a Tap and Current Transformer ratio in the **Pick Up** group box fields.
Primary Amps	Will allow you to type the pick-up current in the **Primary Pick Up** field.
Instantaneous only	Disables the fields associated with the time-current portion of the device curve. You may activate the instantaneous element only (see below).
Multiple of Motor FLC	1. Click on the **Multiple…** radio button. 2. Go to the **SC & FLA settings** box and enter the Full Load Current of your Motor. 3. Click **Compute**, to transfer the Full Load value of the Motor in the **Primary Pick Up** field. For more information see the section on the “Overload curve Set points” in the Multilin 269 manufacturer User Manual.

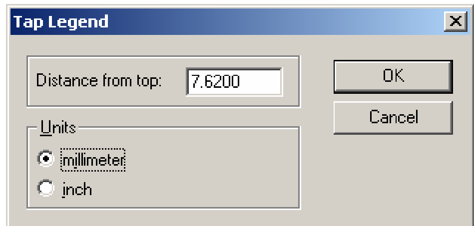
<u>Pick Up Group box</u>



Tap Range	May be selected from the list by clicking on the ▼ symbol and then on the desired tap range. Note that the list shows every tap range available in the database, not just the ones normally available for a particular relay.
Tap L	May be selected from a list by clicking on the ▼ symbol and then on the desired tap. You may also type in a tap value which is not listed, as long as it lies within the tap range.
Current Transformer Ratio (P:S)	Is the ratio of rated primary current P to rated secondary current S of the current transformer to which the relay is connected.
Delta connection	Enable this checkbox if the CT’s are connected in Delta. This will introduce a factor of $1/\sqrt{3}$ to the calculation of Pick-up Amps below. (It also affects the pick-up current for the Instantaneous option.)
Compute	Click this button to calculate the *Pick-up Amps = (CT ratio)* $\times$ *Tap*.
Primary Pick Up	Is the minimum current which will cause the relay to act.
Pick Up Time	For Definite Time Relays, type the pick-up time in seconds.

Options Group Box

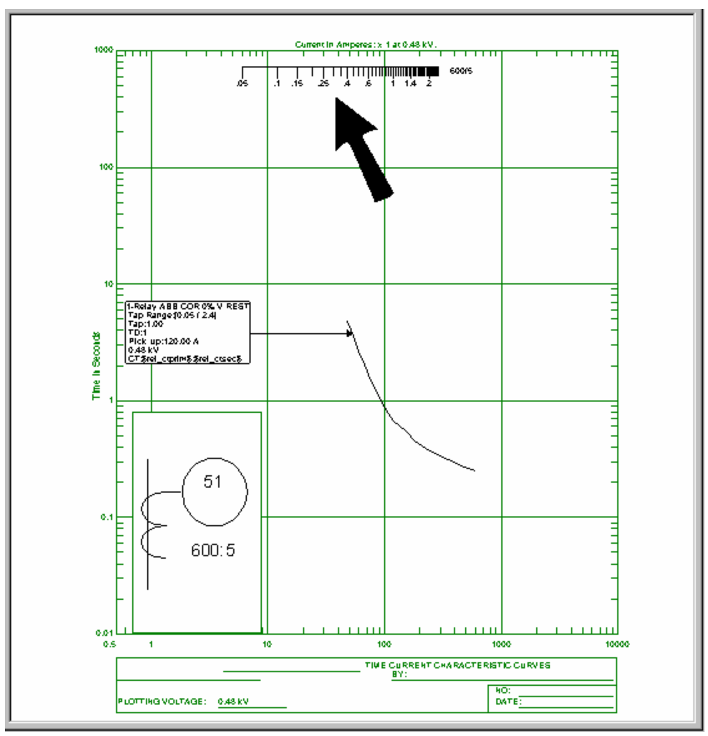
<table>
<tr>
<td>Tap Legend</td>
<td>



This option displays near the top of the Curve Plot a series of short vertical lines indicating the pick-up current for all the taps in the tap range. Use this feature to visualize the available margin for tap setting without having to display the **Relay Settings** dialog box.

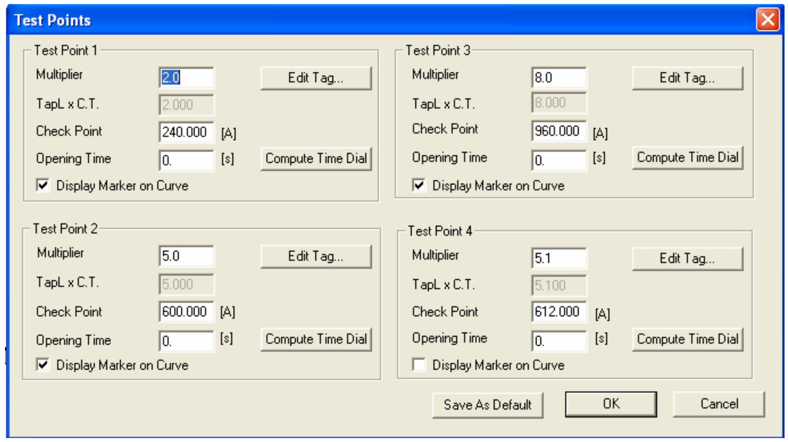
The lines are drawn at a certain distance from the top of the page. By default the distance is 0.3 inches (7.6 mm), but you may change it by typing the desired value in the dialog box. Give a different distance for each relay, so as to avoid overlapping legends.

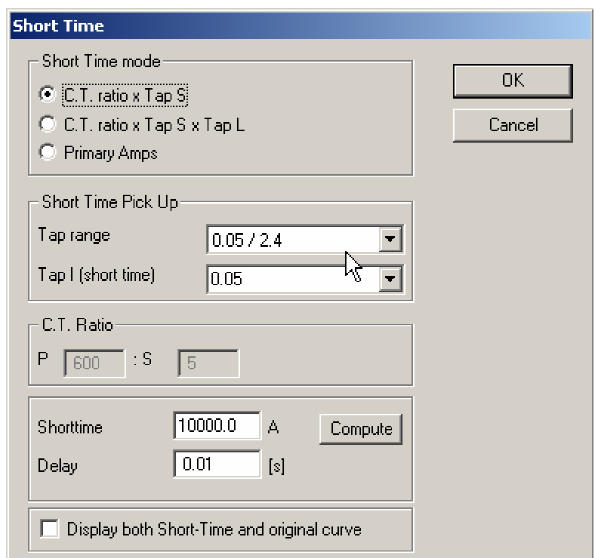
Note: The Tap Legend may be easier to read in the Print Preview mode. (See 3.14.3)



Tap Legend indicates the range of available taps

</td>
</tr>
</table>

<table>
<tr>
<td>Settings Table</td>
<td>Enable the Short Time checkbox (☑). Then click on the button.
This option displays the same dialog box as when clicking the Compute Time dial & Test point button of the Relay Settings dialog box.


</td>
</tr>
<tr>
<td>Short Time</td>
<td>Enable the Short Time checkbox (☑). Then click on the button. This will display the dialog box shown below.


Click on the desired method of determining the short-time pick-up current in the Short Time mode group box. The following operating modes are supported:</td>
</tr>
</table>

CT ratio x Tap S requires a Tap range, Tap within the range, and Current Transformer ratio. Enter these values or choose them from the lists. Click on the **Compute** button to calculate the pick-up value as the product of the short-time tap and the CT ratio, and display it in the **Shorttime** field.

CT ratio x Tap S x Tap L makes the short-time pick-up a function of the long-time pick-up tap setting, the short-time tap and the CT ratio. Click on the **Compute** button to calculate the pick-up current and display it in the **Shorttime** field.

Primary Amps allows you to enter the short-time pick-up current directly, by typing it in the **Shorttime** field.

Select in the **Short Time Pick Up** group box the values required by the operation mode selected:

Tap range may be selected from the list of available tap ranges for the short-time element by clicking on the ▼ symbol and then on the desired range. Only the ranges for the short-time option are displayed in this list.

Tap (Short-time) may be selected from the list by clicking on the ▼ symbol and then on the desired tap. You may enter any tap value, not just the ones shown, as long as it is within the tap range shown.

The **C.T. Ratio** group box displays the ratio of rated primary current P to rated secondary current S of the current transformer to which the relay is connected.

The next group box displays:

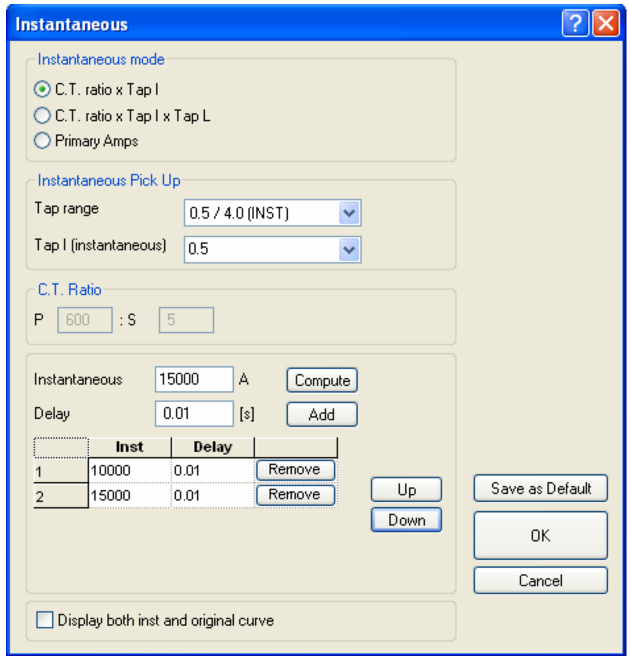
Shorttime (Pick Up) is the current at which the short-time portion of the relay curve begins.

Delay is the maximum reaction time of the short-time element, in seconds.

Finally, checking the **Display both inst and original curve** checkbox at the bottom of the dialog will draw the two curves on the plot.

Instantaneous

Enable the **Instantaneous** checkbox (☑). Then click on the button. This will display the dialog box shown below.



Click on the desired method of determining the instantaneous pick-up current. The following operating modes are supported:

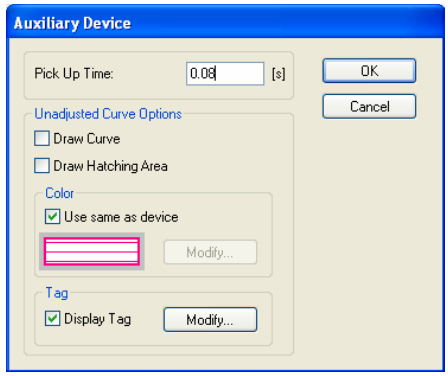
CT ratio x Tap I requires a tap range, tap within the range, and Current Transformer ratio. Enter these values or choose them from the lists. Click on the **Compute** button to calculate the pick-up value as the product of the instantaneous tap and the CT ratio, and display it in the **Instantaneous** field.

CT ratio x Tap I x Tap L makes the instantaneous pick-up a function of the long-time pick-up tap setting, the instantaneous tap and the CT ratio. Click on the **Compute** button to calculate the pick-up current and display it in the **Instantaneous** field.

Primary Amps allows you to enter the instantaneous pick-up current directly, by typing it in the **Instantaneous** field.

	Select in the **Instantaneous Pick Up** group box the values required by the operation mode selected: **Tap range** may be selected from the list of available tap ranges for the instantaneous element by clicking on the ▼ symbol and then on the desired range. Only the ranges for the instantaneous option are displayed in this list. **Tap(Instantaneous)** may be selected from the list by clicking on the ▼ symbol and then on the desired tap. You may enter any tap value, not just the ones shown, as long as it is within the tap range shown. The **C.T. Ratio** group box displays the ratio of rated primary current P to rated secondary current S of the current transformer to which the relay is connected. The next group box displays: **Instantaneous** (Pick Up) is the current at which the instantaneous portion of the relay curve begins. **Delay** is the maximum reaction time of the instantaneous element, in seconds. Finally checking the **Display both inst and original curve** check box at the bottom of the dialog will draw the two curves on the plot. **Intantaneous/Delay list.** You can add as many “levels” as you want in the Instantaneous. Just make sure that they are sorted properly. **Inst** field should increase and the **Delay** should decrease.

<table>
<tr>
<td>Auxiliary Device</td>
<td>
Enable the Auxiliary Device checkbox (☑). Then click on the button to display the following dialog box.



You may enter a Pick Up Time (in seconds) which represents an additional delay introduced by some other device (lock-out relay, circuit breaker, etc.). The relay curve will be shifted upwards by this delay.

Unajusted Curve Options

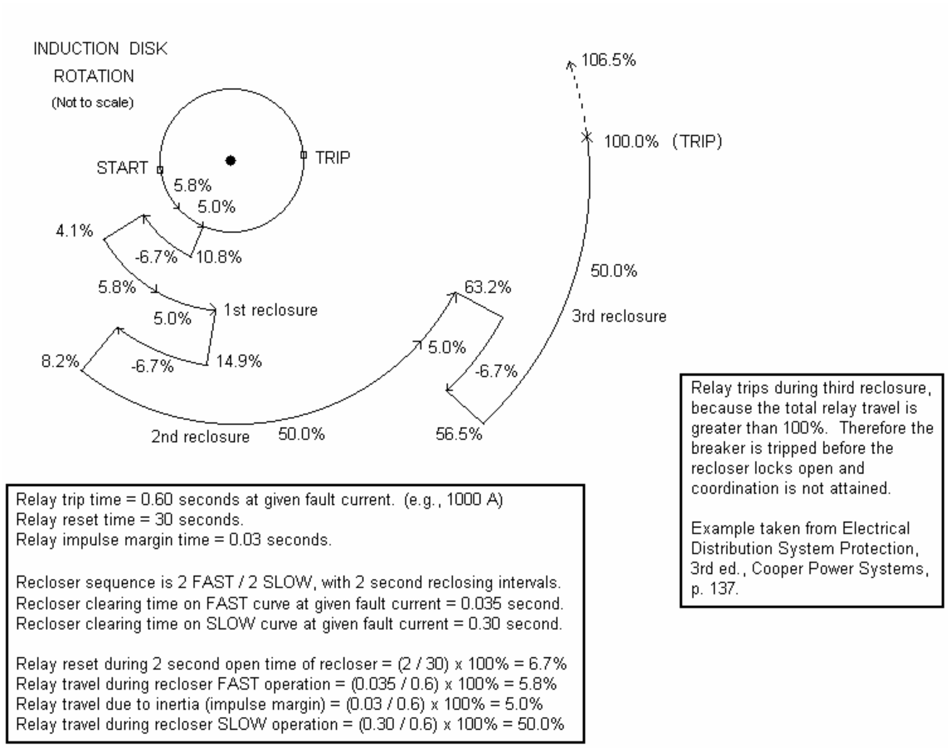
To display the unadjusted relay curve as well, click on the check box marked Draw Curve and/or Draw Hatching Area.
Color: Use the same color as the device if the check box is selected. If not, click on the Modify button to specify a different color.
Tag: To display a tag on the unadjusted curve, click the Display Tag checkbox. To customize the tag text, click the Modify button.

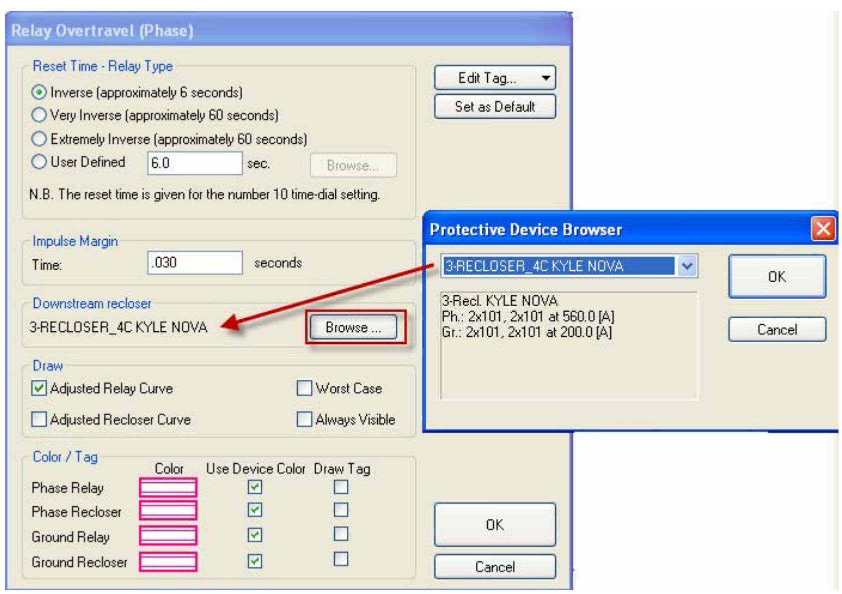
</td>
</tr>
</table>

5.6.2 Overtravel

Overtravel applies to electromechanical relays (induction disc type).

When you are coordinating a Recloser with an upstream (source-side) electromechanical relay, this feature accounts for the ratchet effect, in which the relay does not fully reset during a circuit interruption by the recloser.

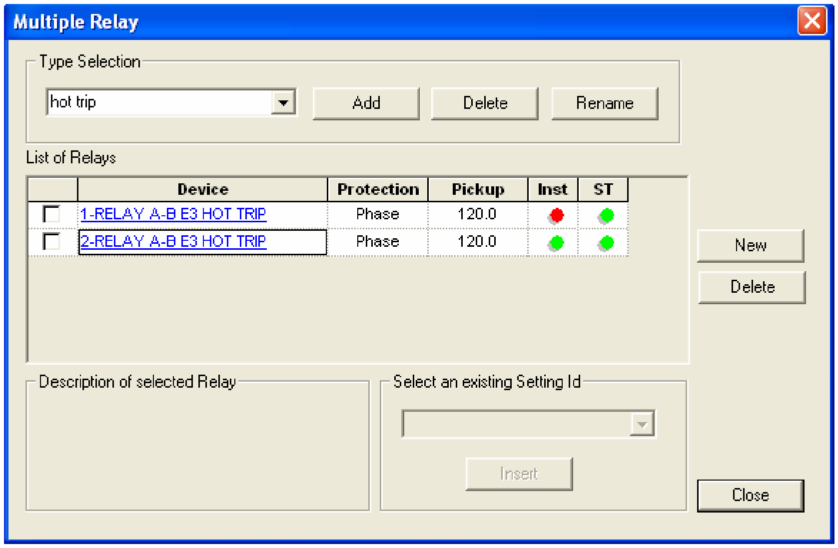




Reset Time – Relay Type Group Box	Time for the relay disk to return to its original position after de-energization.
Impulse Margin Group Box	The time for which the relay disk will continue to "coast" after the fault is interrupted by the downstream device.
Downstream Recloser Group Box	Select the **Downstream Recloser** to allow the program to calculate the overtravel curve with the relay curve. Clicking **Browse** will display the **Protective Device Browser** dialog box to allow selection.
Draw Group Box	**Adjusted Relay Curve** – The overtravel curve will be drawn to adjust the relay curve. **Adjusted Recloser Curve** – The overtravel curve will be drawn to adjust the Recloser curve. **Worst Case** – When this option is on, we assume that the fault currents are different for all operations of the downstream device. **Always Visible** – Check this option if you still want to see the curve on the plot even if the reclosers are hidden.
	We use the **Worst Case** possible for each operation under a downstream device in order to accomplish a minimum number of substation operations for downstream device operations. For the worst case, the relay travel is calculated with the maximum value. Then for a given current we use the maximum relay travel calculated for all the currents of the downstream device. For the normal case, we use the relay travel value calculated for the given current.
Color/Tag Group Box	You have the possibility to select the color of the overtravel curve that will appear on the plot. If you want your curve to be of a different color than the device, uncheck the **Same as color** checkbox then click on the **Color** box to specify a new one. You can also display a tag identifying the curve by checking the corresponding box in the **Draw Tag** column.
Edit Tag	To customize the tag identifying the curve.
Set As Default	If you click on the **Set as Default** button, the options selected will be saved on your computer. The next time you create a relay, the overtravel options will have the same selection as when you clicked the button.

5.6.3 Multiple Relay

The **Create Multi-relay** command allows phase and ground relays to be regrouped into a single device. When you select that menu option, the following dialog box is displayed.



The **Type Selection** group box provides a shortcut to some predefined types. After selecting one, when you click **New**, the dialog opens with the selected type.

- To **Add** a new type to the drop-down list, select one type from the list of relays (Check the box next to it) and click **Add**. If the type already exists, you will be asked if you want to replace it with a new type.
- You can also **Rename** or **Delete** any selection except "None". To rename, type in the new name directly in the combo box and click **Rename**.

To add a new relay in the **List of Relays**, click **New**. If a type is selected, the dialog box will open on the selected type.

If "None" is selected in the **Type Selection**, then the relay dialog box will open:

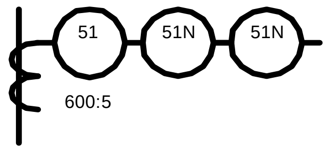
- For the first relay added to the list, the default relay will be selected.
- For the second relay, the dialog box will show the same type as relay #1.

Note: If you already have more than one relay, you can select a specific existing type by clicking the checkbox appearing to the left of its name in the list. The dialog box will open displaying this selection.

To edit a relay, click on its name in the list.

If the Instantaneous (**Inst**) and/or the Short time (**ST**) is enabled (shown as a green dot in the dialog box) you can double-click on the dot to open the related **Instantaneous** or **Short time** dialog box.

On the One-line diagram, the Multiple Relay will be displayed as relay symbols attached to one unique Relay&CT symbol.



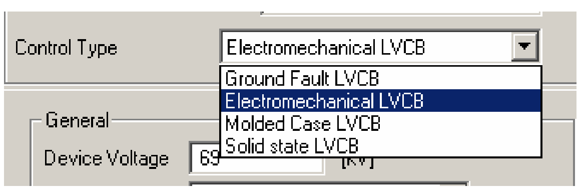
5.7 Low Voltage Circuit Breakers (LVCB)

The LVCBs that you can create are grouped into four categories:

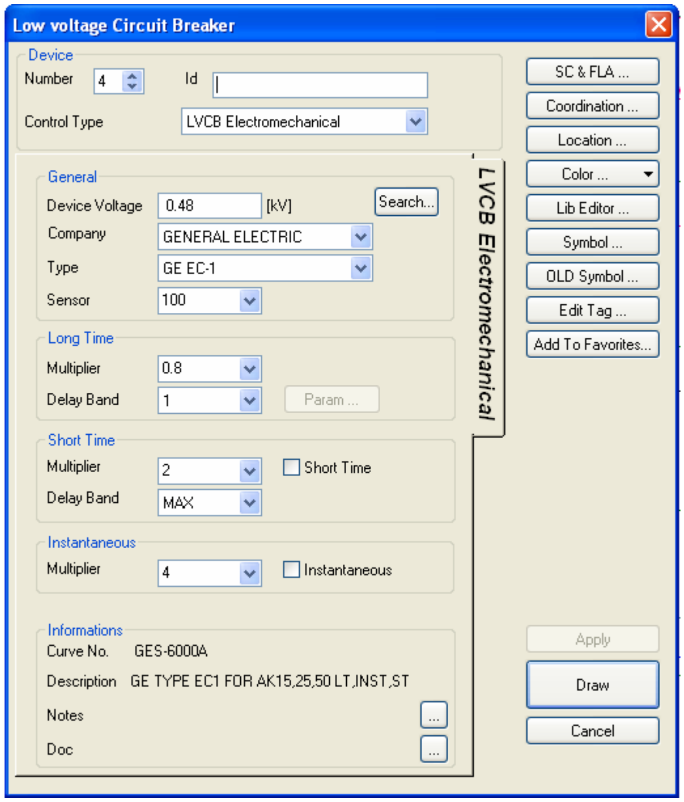
1. Electromechanical LVCB
2. Solid State LVCB (microprocessor trip)
3. Molded Case LVCB
4. Ground Fault LVCB

When creating any LVCB, the functions available on the settings dialog boxes will be as illustrated on the right. The related functionality available is as described at section 5.3 Common Window Elements and Commands.

The LVCB settings dialog box displayed is specific to each type of LVCB. You may change the **Control Type** by clicking as shown below.



5.7.1 Electromechanical LVCB



General Group Box

Company	Identifies the manufacturer. Choose it first.
Type	Identifies the specific device.
Sensor	Is the reference quantity used in conjunction with multiplying factors to find the Long Time, Short Time and Instantaneous Pick-up currents. Select it from the list by clicking on the ▼ symbol and then on the rating, or type in the rating (in Amperes) directly.

Long-Time Group Box

Multiplier	Is applied to the Sensor rating to give the Long Time Pick Up current, at which the long time portion of the device curve begins. Select it from the list by clicking on the ▼ symbol and then on the number, or type in a value which is not shown.
Delay Band	Determines the vertical shift of the long-time portion of the curve. Select it from the list by clicking on the ▼ symbol and then on the band.

Short-Time Group Box

This feature is optional. To activate it, you must enable the **Short Time** checkbox (☑).

Multiplier	Is applied to either the Sensor rating or the Long Time Pick Up current to determine the Short Time Pick Up current, at which the short time portion of the curve begins. Select the Multiplier from the list by clicking on the symbol and then on the number. You may also type in a value which is not shown.
Delay Band	May be selected from the list by clicking on the symbol and then on the band.

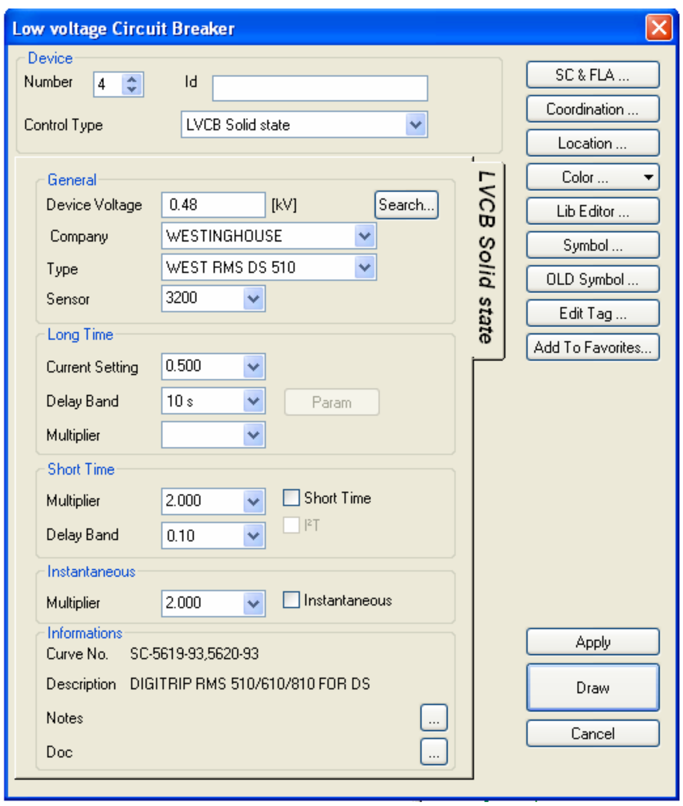
Instantaneous Group Box

This feature is optional. To activate it, enable the **Instantaneous** checkbox (☑).

Multiplier is applied to **either** the Sensor rating **or** the Long Time Pick Up current to determine the Instantaneous Pick Up current, at which the instantaneous portion of the curve begins. Select the multiplier from the list by clicking on the symbol and then on the number. You may also type in a value which is not shown.

5.7.2 Solid State LVCB

These devices are also known as microprocessor-trip low voltage circuit breakers.



General Group Box

Company	Identifies the manufacturer. Choose it first.
Type	Identifies the specific device. You may select from a list by clicking on the ▼ symbol and then on the device name.
Sensor	Is the reference quantity used in conjunction with multiplying factors to find the Long Time, Short Time and Instantaneous Pick-up currents. You may type in the sensor rating (in Amperes) directly, or select it from the list by clicking on the ▼ symbol and then on the rating.

Long-Time Group Box

Current Setting	Is an additional multiplier applied to the Sensor rating for certain devices. Select it from the list by clicking on the ▼ symbol and then on the number. You may also type in a value which is not listed.
Delay Band	May be selected from the list by clicking on the ▼ symbol and then on the band.
Multiplier	Is applied to the Sensor rating to give the Long Time Pick Up current, at which the long time portion of the device curve begins. Select it from the list by clicking on the ▼ symbol and then on the number, or type in a value which is not listed.

Short-Time Group Box

This feature is optional. To activate it, enable the **Short Time** checkbox (☑).

Multiplier	Is applied to either the Sensor rating or the Long Time Pick Up current to determine the Short Time Pick Up current, at which the short time portion of the curve begins. Select the multiplier from the list by clicking on the ▼ symbol and then on the number, or type in a value which is not shown.
Delay Band	May be selected from the list by clicking on the ▼ symbol and then on the band.

Instantaneous Group Box

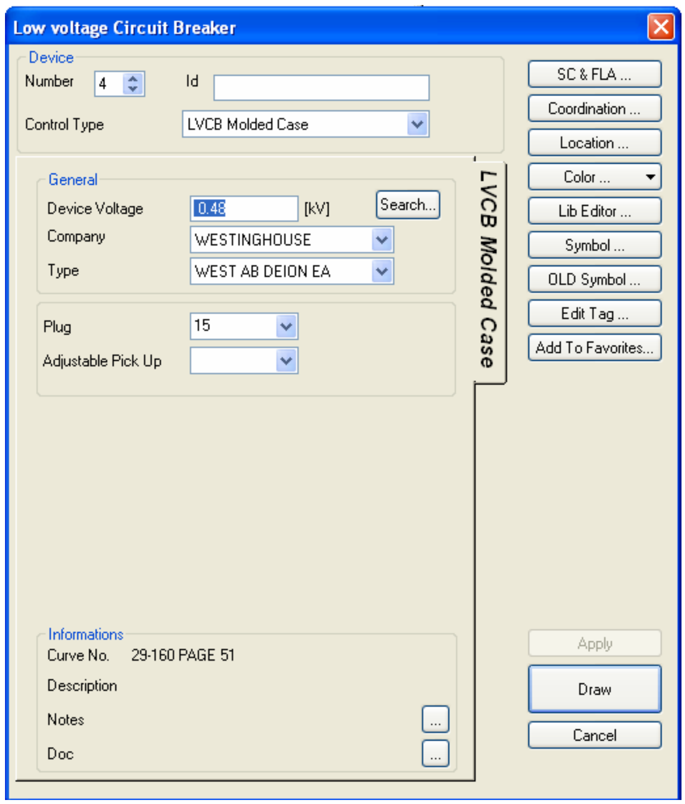
This feature is optional. To activate it, enable the **Instantaneous** checkbox (☑).

Multiplier is applied to **either** the Sensor rating **or** the Long Time Pick Up current to determine the Instantaneous Pick Up current, at which the instantaneous portion of the curve begins. Select the multiplier from the list by clicking on the ▼ symbol and then on the number, or type in a value which is not shown.

The High Range Instantaneous Option, in which the pick-up is equal to the product of the Instantaneous Multiplier and the Short Time Rating, is also supported.

5.7.3 Molded Case LVCB

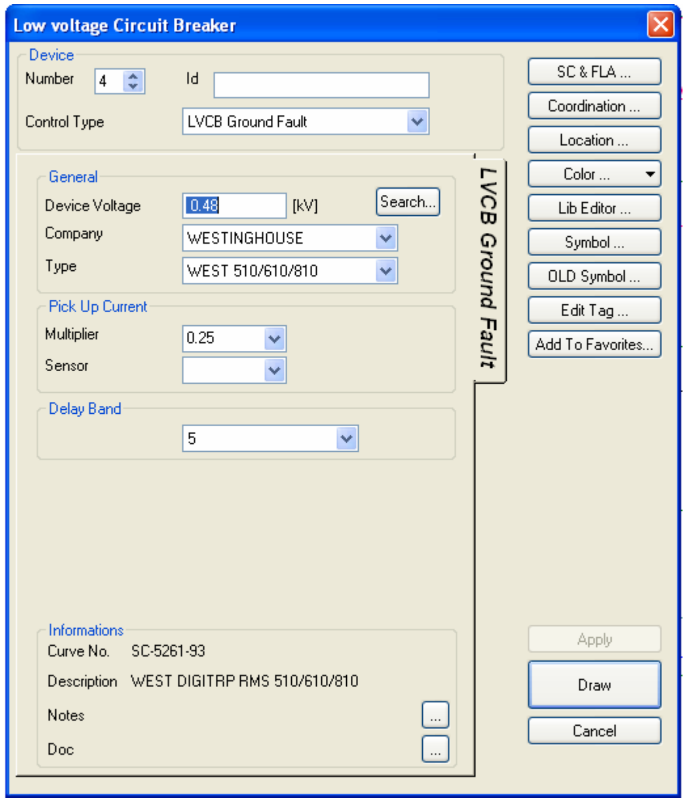
This breaker differs from the solid state and electromechanical breakers in that it does not usually provide any long time settings. It is equipped with user-defined settings for short time or instantaneous tripping. For some devices a list of Plug (sensor) sizes is available. Other devices are provided with pick-up settings for the short time or instantaneous band. Others have simple characteristics resembling those of fuses, without any controls.



Company	Identifies the manufacturer. Choose it first.
Type	Identifies the specific device. Select from the list by clicking on the symbol and then on the device name.
Plug	Is the Long Time Pick Up current. You may type in the sensor rating (in Amperes) directly, or select it from the list by clicking on the symbol and then on the rating.
Adjustable Pick Up	Is a multiplier applied to either the Plug rating or the Frame size to determine the threshold at which the Short Time or Instantaneous portion of the curve begins. Select the Pick Up multiplier from the list by clicking on the symbol and then on the number, or type in a value, which is not shown in the list.

5.7.4 Ground Fault LVCB

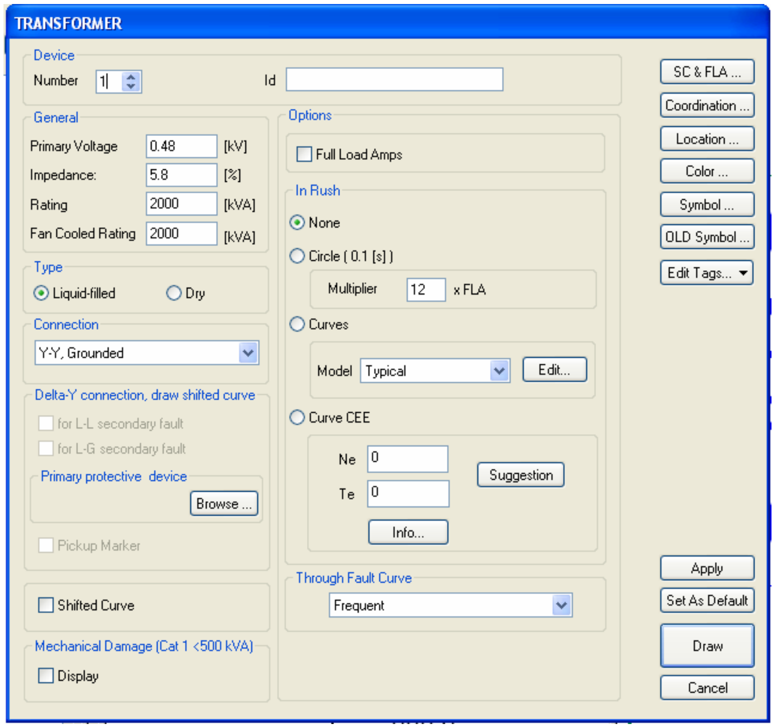
Some low voltage breakers may also provide an option for ground fault. These devices are normally equipped with settings for Pick Up Current and Time Delay.



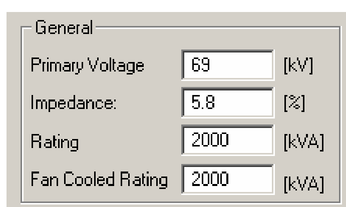
Company	Identifies the manufacturer. Choose it first.
Type	Identifies the specific device. Select from the list by clicking on the symbol and then on the device name.
Multiplier	Is applied to the Sensor rating to determine the Pick Up current. Select the multiplier from the list by clicking on the symbol and then on the number. You may also type in a value that is not shown in the list.
Sensor	Is multiplied by the Multiplier to determine the Long Time Pick Up current. You may type in the sensor rating (in Amperes) directly, or select it from the list by clicking on the symbol and then on the rating.
Delay Band	Identifies the delay band in use. Select the band from the list by clicking on the symbol and then on the number.

5.8 Transformer

Create > **Transformer** draws the damage curve for a transformer, based on information you enter through the dialog box shown below. Click on the **Draw** button to draw the curve. According to ANSI/IEEE Standard C57.109 (and C37.91), the curve may take into account both thermal and mechanical stresses.



<u>General Group Box</u>



Primary voltage	Is the rated Primary Line to Line transformer voltage (in kV).
Impedance	Is given in % (not in per-unit), based on the kVA rating (not fan-cooled).
Rating	Is the base power rating of the transformer in KVA. For a single-phase transformer, enter the single-phase rating and choose Single Phase L-L or L-G from the list in the **Connection** group box.

Fan Cooled Rating	Is the power rating when all stages of cooling and permitted temperature rise are considered. It determines the Full Load Amps. Typically, forced cooling gains the following percentage increases over the base kVA rating: • First stage of fans: 33% • Second stage of fans: 25% • 10^{o}C rise (65^{o}C instead of 55^{o}C above ambient, for transformers so rated): 12.5% **<u>Example</u>**: A 1000 kVA transformer rated for 55^{o}C above ambient, equipped with two stages of cooling and allowed to operate at 65^{o}C above ambient would have a Fan-cooled rating of *1705 kVA = 1000 kVA x (1 + 0.33 + 0.25 + 0.125)*.

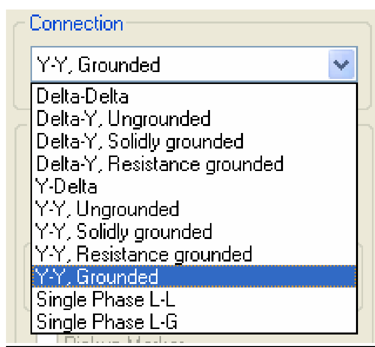
Type Group Box

A transformer can be configured as Liquid-filled or Dry. (Ref: IEEE Std 141-1993)

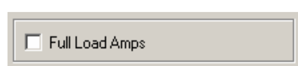
- Category I, dry type, (5-500 kVA single-phase, and 15-500 kVA three-phase)
- Category II, dry and liquid filled, (501-1667 kVA single-phase, and 501-5000 kVA three-phase)

Connection Group Box

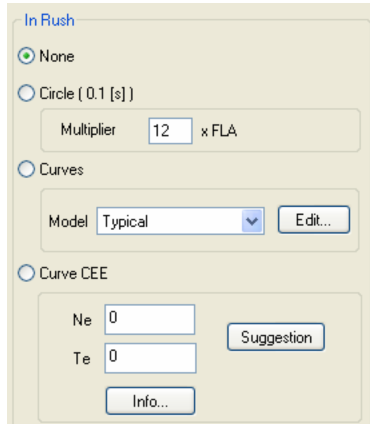
Select the **Connection** type of your transformer from the drop down list.



Options Group Box

Full Load Amps Option	 When you mark the **Full Load Amps** check box, the application draws a vertical line indicating the current drawn when the transformer is carrying its Fan-cooled kVA rating. The line is identified by an Identification Tag on the curve plot.

Magnetization Inrush Option Group Box



Circle: Draws a circle at 0.1 second to indicate the high current drawn for a few cycles when the transformer is energized. You may define this current as a multiple of the normal load current (computed from the base kVA rating).

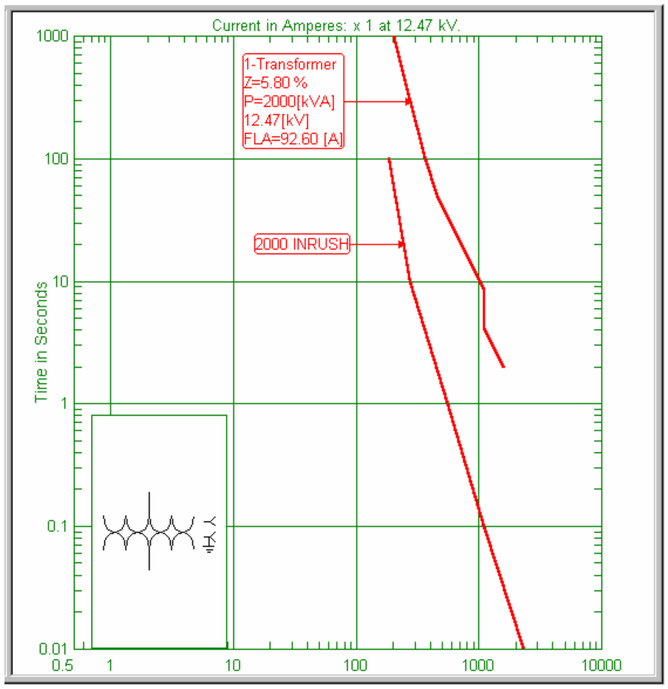
Curves: **Model Typical:** Alternatively, you may represent the inrush as a piecewise-linear curve passing through the following 5 points: **(100s; 200%)**, **(10s; 300%)**, **(1s; 600%)**, **(0.1s; 1200%)** and **(0.01s; 2500%)**, where the current is expressed in per-unit of the base current (i.e., the base kVA rating).

Edit: Create your own damage curve using the Library Editor > Views > Transformer InRush. (see Transformer In Rush in chapter 13.3.1.7 for more information).

Curve CEE: (more details to come)

This inrush curve may be useful for accounting for cold-load pick-up, where load remains connected to the secondary of the transformer upon de-energization, and is therefore energized at the same time as the transformer. If the transformer is re-energized after a prolonged outage (several hours or more), then normally intermittent thermostatically-controlled loads (such as air-conditioning) may come on continuously until they once again satisfy their temperature settings. Load diversity is eliminated temporarily because all such loads will be on during this time.

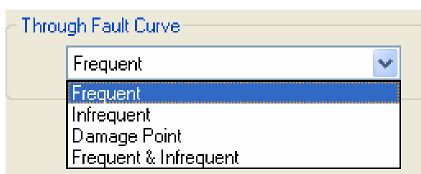
The inrush is identified by an Identification Tag.



Inrush modeled as a TCC curve

Through Fault Curve Option Group Box

Through Fault Curve provides four possibilities.



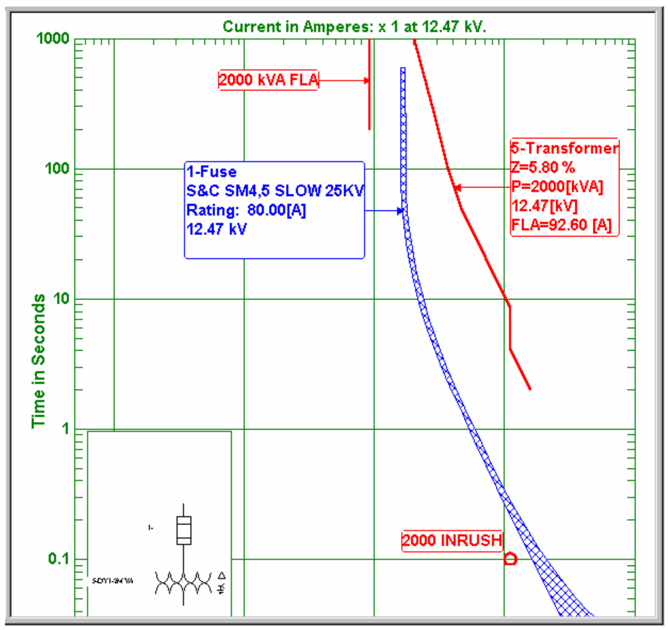
Infrequent	**Infrequent** through-fault (meaning typically fewer than 10 secondary-side faults during the transformer's life) accounts only for thermal damage to the insulation.
Frequent	**Frequent** through-fault (meaning typically 10 or more faults on the secondary side during the transformer's life) accounts also for cumulative mechanical damage to the winding insulation due to movement of the windings under short-circuit magnetic forces. This mechanical damage is more pronounced at high currents. Hence, the curve is shifted down at high currents.
Frequent & Infrequent	Draws both curves described above.

Damage Point

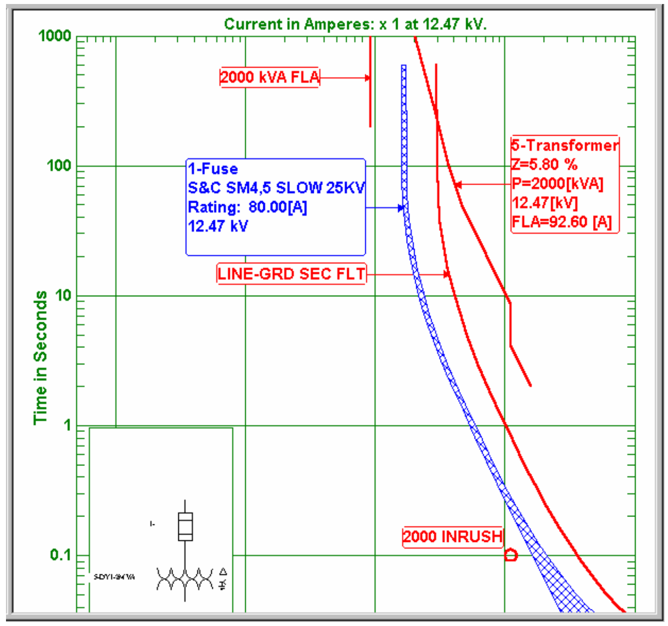
An alternative defined by the 1975 version of the IEEE Buff Book (IEEE Std. 242-1975) is to plot a **Damage Point** at coordinates (A,T) given by:

A = (100 / Z%) × Base curent   T = (Z% - 2) seconds

Example: The Full Load Amps, Inrush and Frequent Through-fault curve of a transformer are illustrated below. The fuse curve shown is coordinated with all three of these elements. The fuse protects the transformer against three-phase faults, does not blow when the transformer is energized, and does not blow when the transformer is fully loaded. In fact, the possibility to overload the transformer remains, which may be desirable.

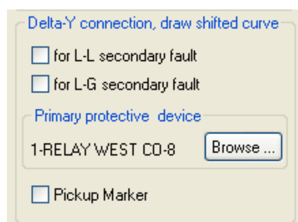


Protecting a Transformer from 3-phase faults



Fuse is less sensitive to secondary Ground Faults on a Delta-Wye Transformer (see below)

<u>Delta-Y Connection Option Group Box</u>

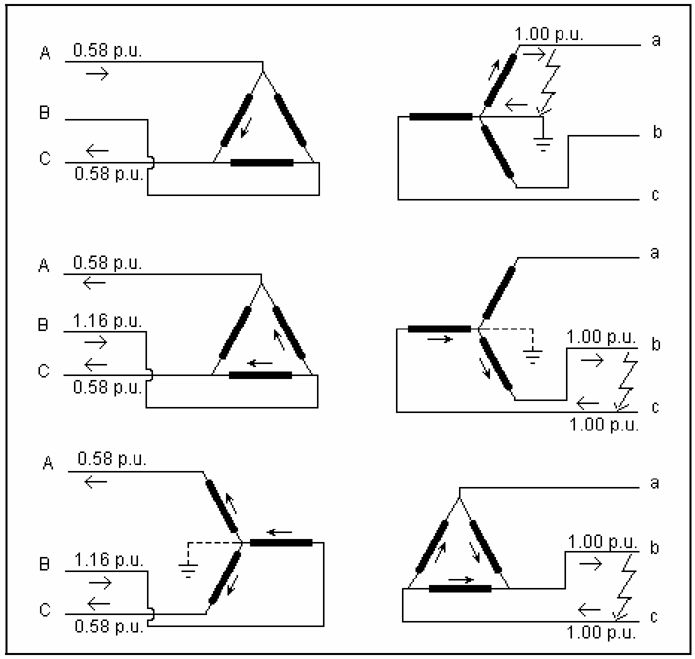


The **Delta-Y Connection, draw shifted curve** group box accounts for the effect of the **Delta-Y** or **Y-Delta** transformer connection on the fault current observed by an upstream device during an unbalanced fault on the transformer secondary.

Click on the **Browse** button to select the primary protective device.

For L-L secondary fault	A **line-line fault** of 1.0 p.u. on the secondary produces a current of 1.16 p.u. in one phase of the transformer primary (and 0.58 p.u. in the other two). Click on this option to plot an <u>additional</u> curve for the selected device upstream from the transformer. This additional curve represents the device curve *shifted to the left by a factor of 0.87 (= 1/1.16).*
for L-G secondary fault	A **line-ground fault** of 1.0 p.u. on the secondary produces a current of only 0.58 p.u. in two phases of the primary. Click on this option to plot an <u>additional</u> curve for the selected device upstream from the transformer. This additional curve represents the device curve *shifted (to the right) by a factor of 1.73 (= 1/0.58)*. (This option applies only to the Delta-Y *solidly grounded* connection.)

Pickup Marker	Display a small vertical line at the top of the plot show the pickup of the primary protective device. This is to facilitate the visual verification of the transformer protection. It helps in making sure that the curve stand between the Full Load curve and the damage curve.



How D-Y and Y-D Transformers transform unbalanced faults

<u>Shifted Curve Option</u>

The **Shifted Curve** option *shifts the transformer curve* (to the left) by a factor of 0.58. This may be useful in ground fault coordination if the transformer connection is Delta-Y. In that case, it is an alternative to the **Shift device** option described above.

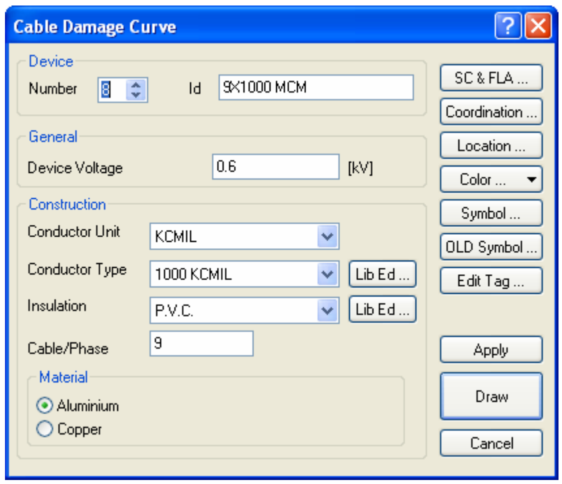
<u>Mechanical Damage</u>

Shows the Mecanical damage curve for Category 1 Transformer. (Less or equal to 500 KVA).

5.9 Cable Damage Curves

An important consideration in protection coordination studies is whether the feeder cables are able to withstand the thermal effects of fault currents until protective devices clear the fault. Taking into account the conductor size and material as well as the insulation type, it is possible to arrive at curves specifying the maximum permissible exposure time of a given cable to a certain fault current. These curves are commonly known as “cable damage” curves. The curves drawn by CYMTCC adhere to the IEEE standard 242-1986 (Buff book).

When creating a cable damage curve, the functions available on the **Settings** dialog box will be as illustrated below. The related functionality available is as described at section 5.3 Common Window Elements and Commands.

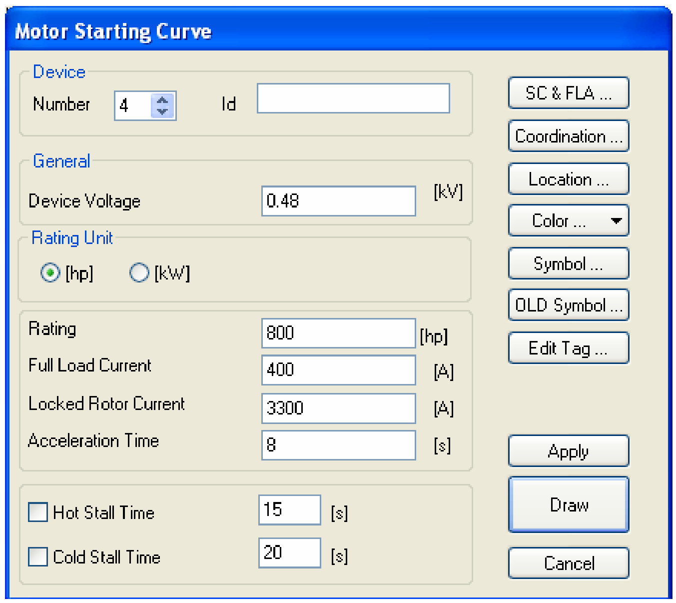


Conductor Type	May be selected from a list by clicking on the symbol and then selecting the size. Note that European and North American sizes are listed. Note also that the unit ‘kcmil’ has replaced ‘MCM’ as the abbreviation for “thousand circular mils”.
Insulation	May be selected from a list by clicking on the symbol and then selecting the type.
Cable / Phase	Allows you to enter the number of conductors per phase. **Note**: In the case of *overload* protection for a circuit of two or more cables per phase, enter the number of cables per phase. For *short-circuit* protection where one cable only might be faulted, you may want to plot the curve of only one cable per phase, because it will carry almost all of the fault current.
Material	Allows you to select aluminum or copper conductors. Click on your choice.
Lib Ed.	Library Editor. The Library Editor button appears twice: one for the conductor type and one for the Insulation. Click the button to open the Library Editor with either the Insulation or the Conductor type selected.

5.10 Motor Starting Curve

Based on the full load current (rated current), the acceleration time and the locked rotor current, it is possible to trace a conservative motor starting curve, for the purpose of protection coordination.

When creating a motor starting curve, the functions available on the **Settings** dialog box will be as illustrated below. The related functionality available is as described at section 5.3 Common Window Elements and Commands.

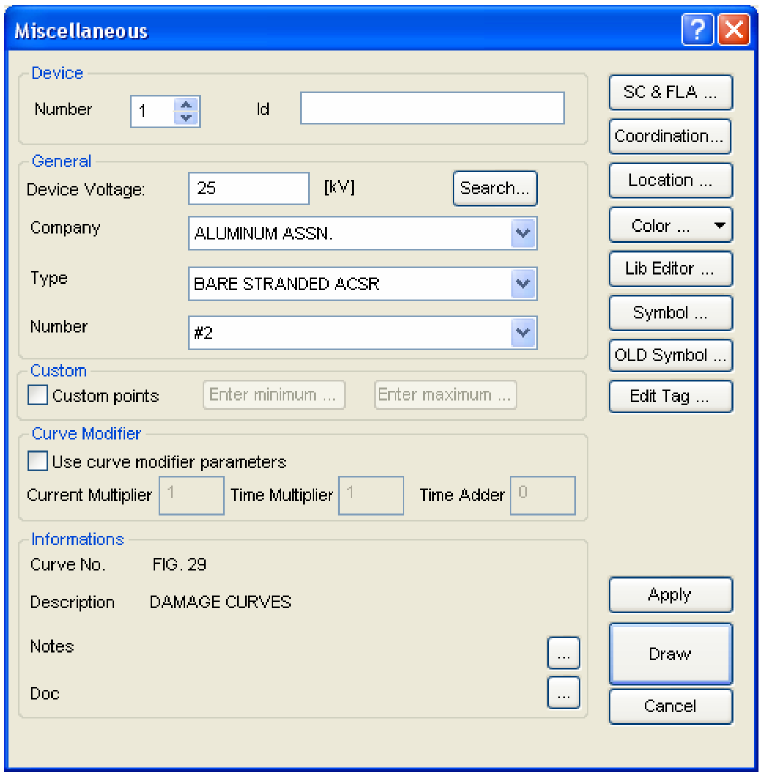


Rating Unit	Select hp or kW.
Rating	Is the value which will be indicated next to the motor symbol in the One-line diagram. It must be greater than or equal to 1.
Full Load Current	Is the rated current of the motor, in Amperes.
Locked Rotor Current	Is the current drawn by the motor when energized at standstill. The motor is (conservatively) assumed to draw this current until the Acceleration Time has elapsed.
Acceleration Time	Is the number of seconds which the motor requires to accelerate itself and its load to full speed. When that is accomplished the motor current falls to nominal.
Hot Stall Time	Is the number of seconds during which the motor may be allowed to draw its locked rotor current without being damaged, if it is already warm when started.
Cold Stall Time	Is the number of seconds during which the motor may be allowed to draw its locked rotor current without being damaged, if it is at ambient temperature when started.

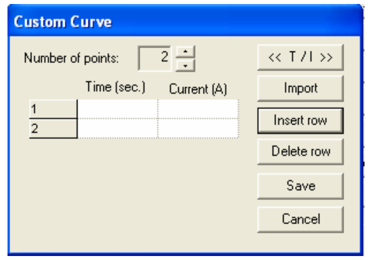
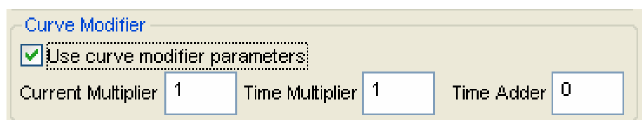
5.11 Miscellaneous (User-defined)

This category includes time-current curves for devices not modeled in the other categories supported by CYMTCC.

When creating a user-defined curve, the functions available on the **Settings** dialog box will be as illustrated below. The related functionality available is as described at section 5.3 Common Window Elements and Commands.



Company	Identifies the manufacturer. Choose it first. **<u>Note</u>**: This field might be different than the actual company: it also identifies a group or a category.
Type	May be selected from the list by clicking on the ▼ symbol and then on the desired curve description.
Number	Is the specific curve within the selected type. You may select it in the same way.

Custom Points	Gives the possibility to enter a time-current curve (**Enter Minimum** and/or **Enter Maximum**) in a spreadsheet-mode that can be stored in a study.  You can enter up to 40 Time/Current Points for each the minimum and the maximum. Click on the *up* and *down* arrows to increase or decrease the number of points, which will add or remove a row in the spreadsheet. Alternatively, to insert a row, place your cursor on the list below where you would like to insert a row and click **Insert Row**. To delete a row, place your cursor on the row to delete and click **Delete row**. The **Import** button lets you import time/current points from a comma-delimited text file. The **<< T / I >>** button switches the value from the Time to the Current column or from the Current to the Time column.
Curve Modifier	Allows you to shift the curve by entering a Current Multiplier and/or Time Multiplier and/or a Time Adder. 

5.12 Symbol

This menu command inserts a symbol into the One-line diagram, upstream from the selected device. When you click on this menu command, another menu of symbols appears, from which you may select the symbol.

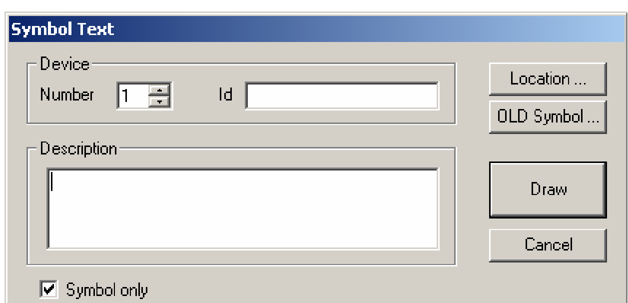
When creating a symbol, the functions available on the Settings dialog box will be as illustrated below. The related functionality available is as described at section 5.3 Common Window Elements and Commands.

Symbols available include:

- Bus
- Bus Duct
- Capacitor
- Circuit Breaker Box
- Contactor
- Feeder Tie
- Generator
- Line
- Load
- Panel
- Motor Control Center
- Rectifier
- Regulator
- Switch
- Transformer 3 winding
- Load from file

Sometimes, a symbol such as a **Lighting Panel** is the first item entered in a new study because it represents the equipment furthest downstream (i.e., the load). Often, it is desirable to include **Bus** symbols in the One-line Diagram to indicate the nominal voltage at their locations.

All symbols can be assigned a description, which can be displayed next to them in the One Line via **Options > Show Symbol Label** (Section 8.13)

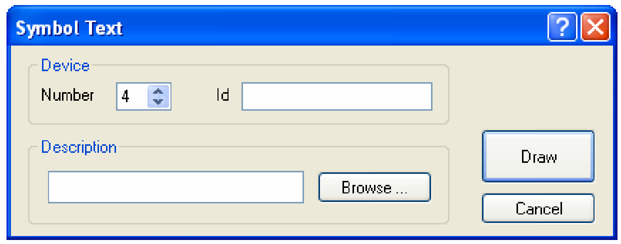


Note:	These symbols have no effect on the Curve Plot. Use them to provide additional details in the One-line Diagram.

5.12.1 Load from file

It is now possible to load a symbol from a file.

In case you need a new symbol; we will create it and send you the file; instead of waiting for the next release. Use this function to load it.



5.13 Special Details

This option displays a sub-menu of three options that allow you to customize the Curve Plot by adding **Circles**, **Lines** and **Text** to it. The Special Details Toolbar features the same options (see section 1.6.12).

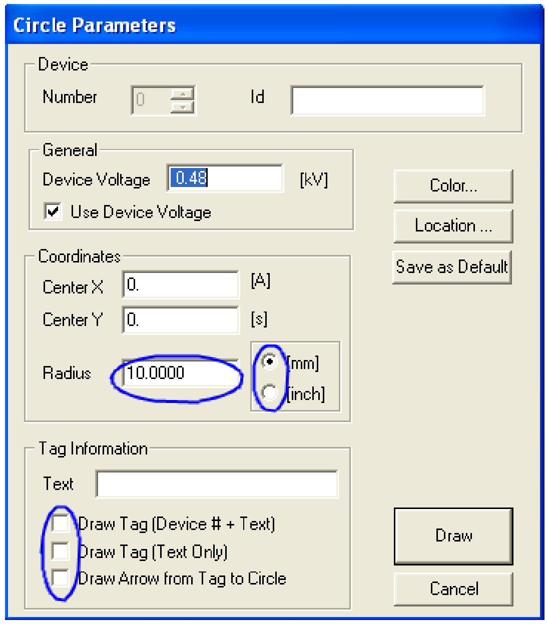
When creating a detail, the functions available on the **Settings** dialog box will be as illustrated below. The related functionality available is as described at section 5.3 Common Window Elements and Commands.

Note: The position of these items on the Curve Plot is defined relative to the current scale printed along the X-axis of the Curve Plot, and is not affected by the current scale multiplier (**View > Plot**, Section 6.11). Thus, these items will not move left or right along with the device curves when the current scale multiplier is changed.

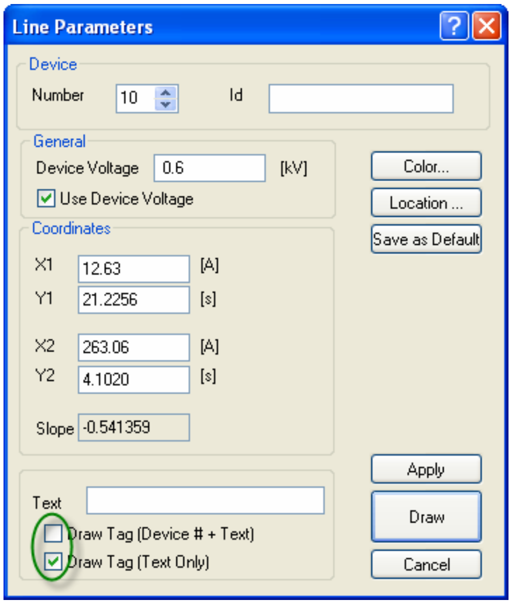
However, you have the option (**Use Device Voltage**) to have these details moved when the plot voltage is changed, so that, for example, a circle drawn around the intersection of two curves will still be drawn around the intersection of the curves even if the Plotting voltage is changed.

Note: To edit an existing Special Detail, double click on item on the plot or select it from the **Device List** in the **Main Toolbar** (Section 1.6.3) and then double-click with the left-mouse button on an empty spece on the Curve Plot.

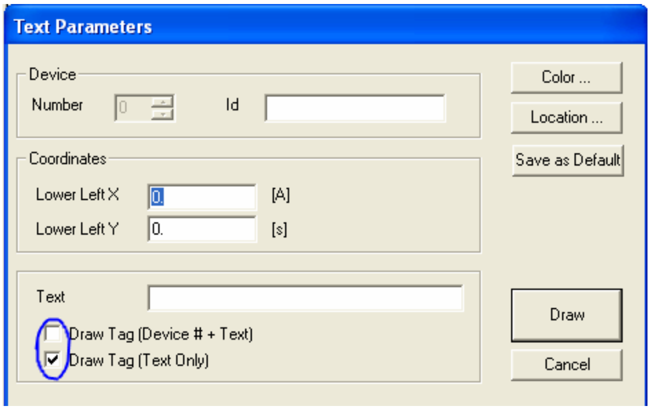
To delete a Special Detail, select it from the **List** and press the Delete key.



Device Voltage	Clicking the check box, the curve will be drawn based on the factor of the plotting voltage vs device voltage.
Center X	Is the X coordinate (in Amperes) of the center of the circle.
Center Y	Is the Y coordinate (in seconds) of the center of the circle.
Radius	Is the radius of the circle. Units for the radius may be either millimeters or inches. Click to select.
Text	Allows you to enter the text of the Tag associated with the circle. This Tag is displayed only if a check mark (☑) appears in either of the **Draw Tag** check boxes.
Draw Tag (Device # + Text)	Displays the tag on the plot with its device number on top of the text.
Draw Tag (Text Only)	Display the tag with the text only.
Draw Arrow from Tag to Circle	Enabling or disabling this option will draw, or not, an arrow between the tag and the circle.
Set as Default	Clicking on that button will save a number of options selected, as shown in the picture above. (circled items)



Device Voltage	Clicking the check box, the curve will be drawn based on the factor of the plotting voltage vs device voltage.
X1	Is the X coordinate (in Amperes) of the starting point of the line.
Y1	Is the Y coordinate (in seconds) of the starting point of the line.
X2	Is the X coordinate (in Amperes) of the ending point of the line.
Y2	Is the Y coordinate (in seconds) of the ending point of the line.
Slope	The slope of the selected line. To recalculate the slope, click the **Apply** button.
Text	Allows you to enter the text of the Tag associated with the line. This Tag is displayed only if a check mark (☑) appears in either of the **Draw Tag** check boxes.
Draw Tag (Device # + Text)	Displays the tag on the plot with its device number on top of the text.
Draw Tag (Text Only)	Displays the tag with the text only.
Set as Default	Clicking on that button will save a number of options selected, as shown in the picture above. (circled items)

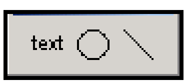


Lower Left X	Is the X coordinate (in Amperes) of the lower left corner of the text box.
Lower Left Y	Is the Y coordinate (in seconds) of the lower left corner of the text box.
Text	Is the text to appear in the Tag.
Draw Tag (Device # + Text)	Displays the tag on the plot with its device number on top of the text.
Draw Tag (Text Only)	Displays the tag with the text only.
Set as Default	Clicking on that button will save a number of options selected, as shown in the picture above. (circled items)

5.14 Special Details Toolbar

The Special Details Toolbar (section 1.6.12) is useful for adding a text label, or drawing a circle or a line where needed on the plot.

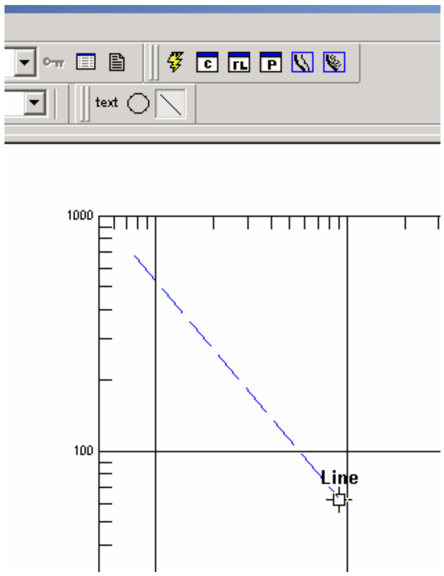
If the Specials Details Toolbar is not displayed, go to the **View > Customize > Toolbar** menu option and select **Special Details** from the list of available toolbars.

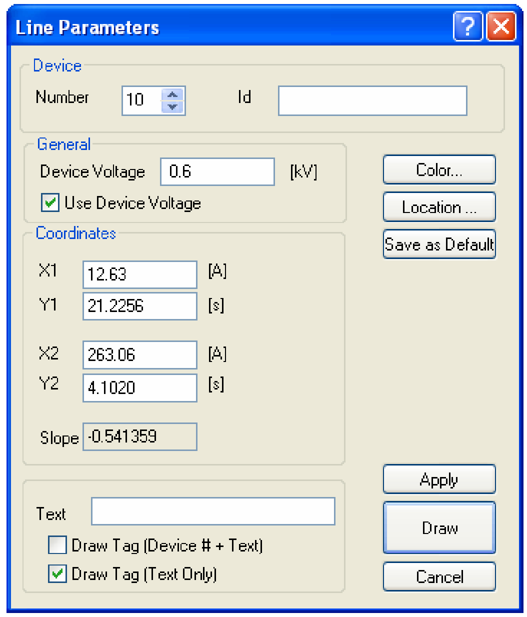


To add a Text label or a circle, click on the appropriate button in the toolbar and click on the plot to specify the location where it will be displayed.

To add a line, click on the **Line** button, and click on the plot with the left mouse button. The first click will indicate the *X1, Y1* location. Hold down the mouse button, the mouse cursor will change to “Line”. Move the cursor to the desired *X2, Y2* location and release the mouse button.

After this operation is done, the proper dialog box will open displaying the appropriate coordinate(s).

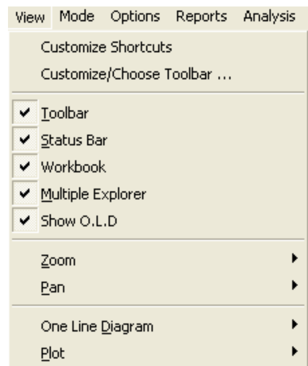

text
1000
100
Line


Line Parameters
Device
Number
10
Id
General
Device Voltage
0.6
[kV]
Use Device Voltage
Color...
Location ...
Save as Default
Coordinates
X1
12.63
[A]
Y1
21.2256
[s]
X2
263.06
[A]
Y2
4.1020
[s]
Slope
-0.541359
Text
Draw Tag (Device # + Text)
Draw Tag (Text Only)
Apply
Draw
Cancel

Chapter 6 The View Menu

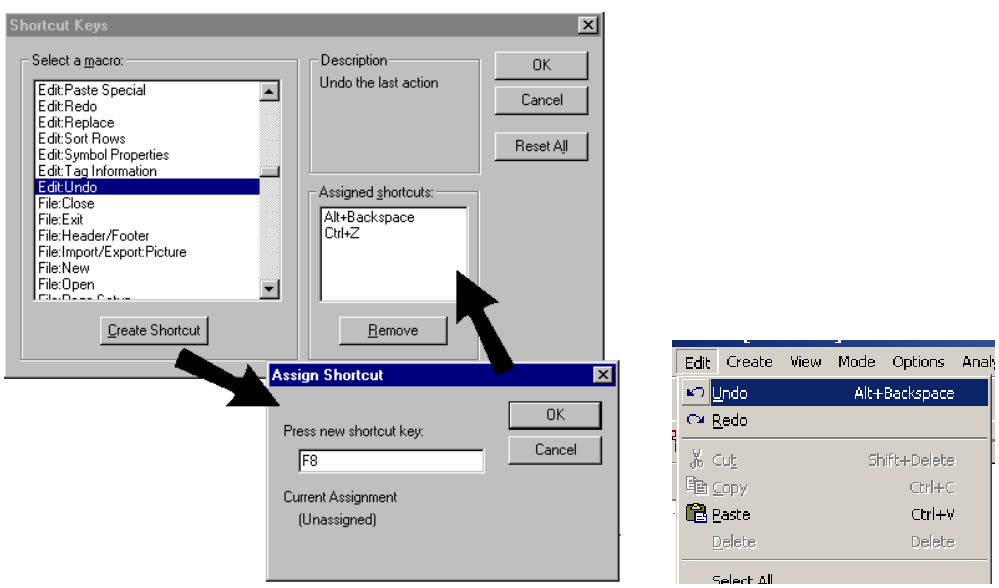
6.1 Introduction

You may control the way information is displayed on the screen by selecting options in the View menu. Most **View** commands remain active until you click on them again. Note that the Curve Plot workspace always remains active.



6.2 Customize Shortcuts

This option allows you to set your own short-cut key combinations for menu commands. When you set a short cut for a command that is included in the menus, it will be shown next to the menu command. To remove one of the pre-set shortcuts, click to highlight the **Assigned Shortcut** and click on **Remove**.

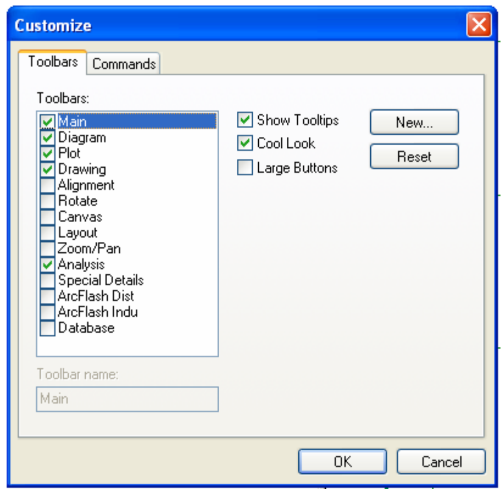


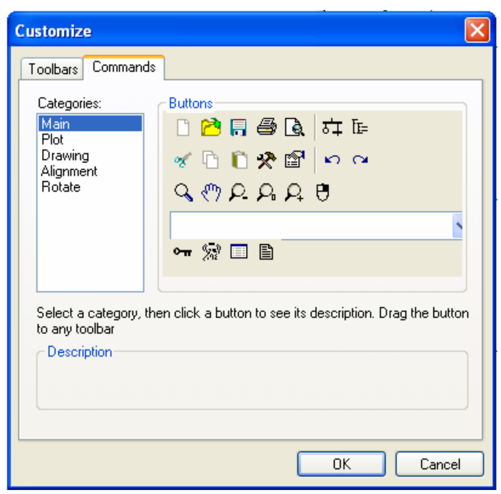
*Setting “F8” as a third short-cut for **Edit > Undo***

6.3 Customize Toolbars

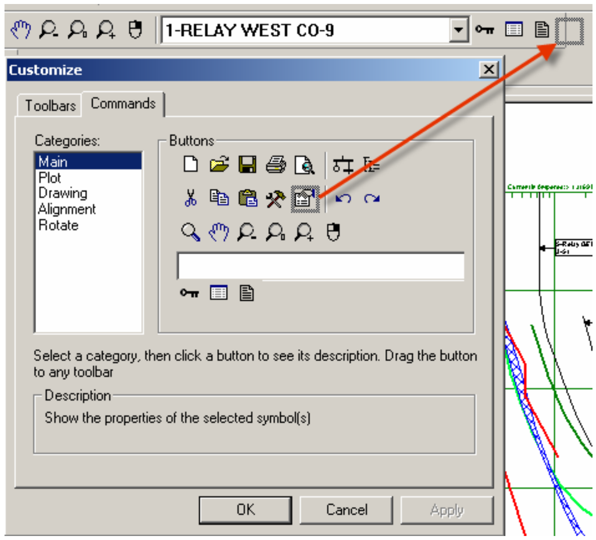
Displays the **Customize** dialog box that allows you to:

- Add icons in toolbars (Section 1.6.2 CYMTCC Toolbars) and remove any, as desired.
- Hide or display toolbars.
- Display the tooltips that identify the icons by function when you place the cursor over them.
- Eliminate the dividers between icons ("cool look") or use larger buttons.





Hint:	While this command is active, you can click-and-drag icons from one toolbar to another, or to a different location in the same toolbar. (No need to the press ALT key.)



Click on the **Reset** button to put the modified toolbar back to its default icon content.

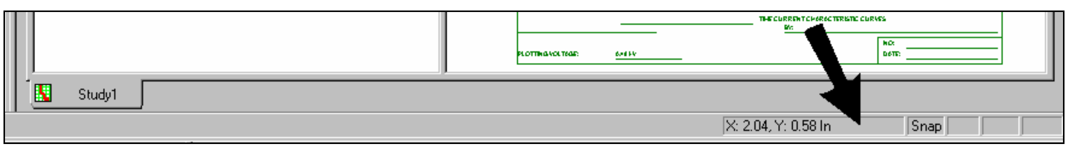
Note:	While the **Customize** dialog box is open, you can **change the length of the combo boxes** (Devices and plotting voltage) and mouse time/current position field. Select the item then click, with the left mouse button, on the right side of the item. Keep the mouse button pushed down and move on either side to resize.

6.4 Toolbar

Displays or hides the Main Toolbar. (See Section 1.6.3)

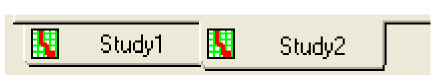
6.5 Status Bar

Displays or hides the Status Bar (at the bottom of the screen).



6.6 Workbook

Displays or hides the tabs of the Workbook Bar that identifies the opened studies. You gain a little working room if you hide them while you work in one study.



6.7 Multi Explorer

Hides or displays the Multi Explorer Pane. Toggle the Multiple Explorer **on** or **off** via the menu: **View > Multiple Explorer**, or by clicking the icon. You can also close the pane by clicking on the “x” located at its upper right corner.

See Chapter 16 The Multi-Explorer for a complete description of all the options included in the multi-Explorer.

6.8 Zoom

Zoom All	Reduces the view magnification until all window contents are visible.
Zoom In	Magnifies the view of the active window. May be used repeatedly. **Note:** **Window Zoom** is an alternative to **Zoom In.** See Section 1.7 Mouse Commands.
Zoom Out	Reduces the view magnification of the active window. May be used repeatedly to include more and more of the window contents in the view.
Zoom-Pan on right mouse button	Activates the zoom and pan functions to be done with the right mouse button. See 1.7.2 Pan and Zoom.

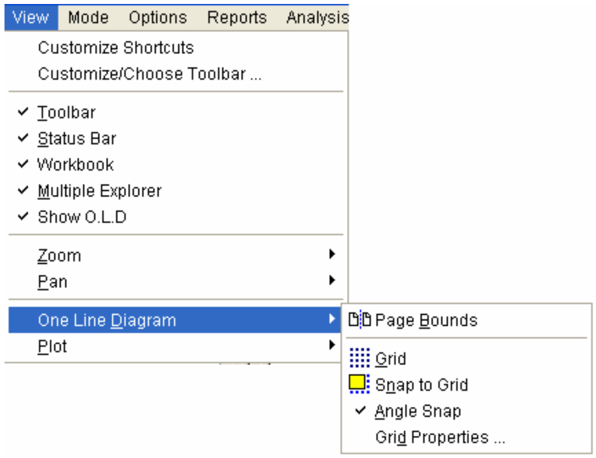
6.9 Pan

These commands move the contents of the active Curve Plot window in the indicated direction (Right, Left, Up, Down) by a distance equal to one half the width or height of the area shown in the window. Thus the Pan will move the drawing less when you have magnified the view via the **Zoom In** or **Window Zoom** commands (see Section 6.8 Zoom).

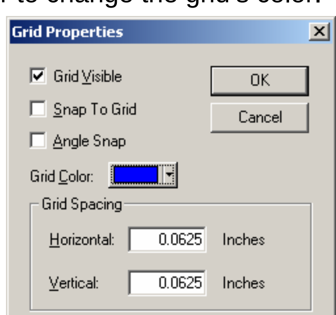
Note: Panning with the mouse is an alternative to these commands. See Section 1.7.2 Pan and Zoom.

6.10 One Line Diagram

The One-Line Diagram command includes page management options.



Page Bounds	Displays the one line "canvas" divided into "pages". If you make your one line diagram larger than one page, it would be printed on two or more pages. Use this command if you have defined a large canvas size, to see what part of the one line would print on which page and thus help you arrange your one line so that it divides nicely into pages. **File > Preferences > Diagram Measurements and Size** (See 3.10.8) allows you to define the canvas dimensions to be larger than those of a standard page (defined using **File > Page Setup Diagram**).
Grid	To display or hide the grid (small dots at regular intervals) to help you align symbols.
Snap to Grid	To align to the grid the top left handles of each component in your diagram.
Angle Snap	To limit the rotation of objects to fifteen-degree increments.
Grid Properties	To display the Grid Properties dialog box to change the distance between the points of the grid or to change the grid's color.

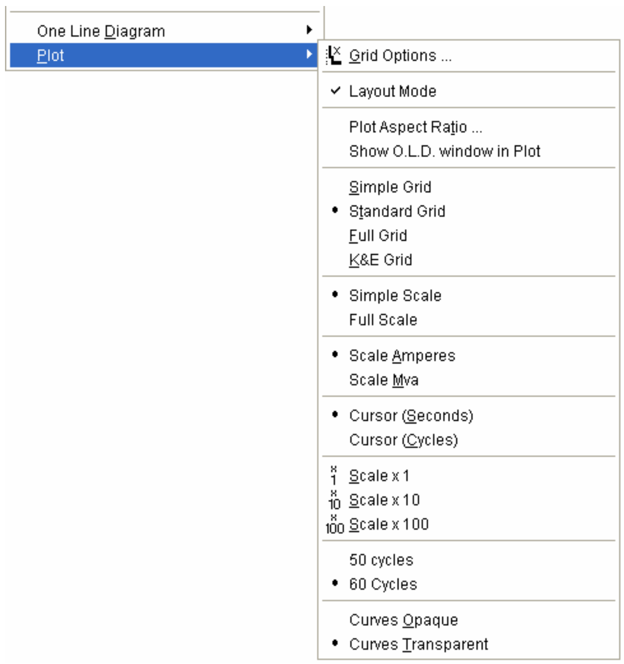


6.11 Plot

The commands in this View sub-menu allow you to adjust the appearance of the Curve Plot through parameterization of your workspace.

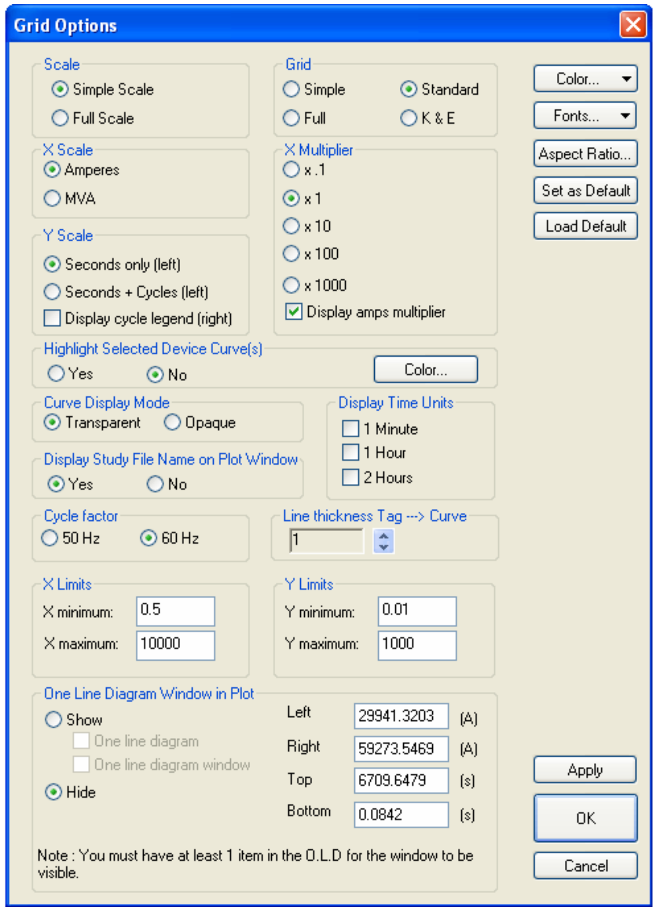
Two options in this menu will display dialog boxes for adjustments; these are the Grid Options and the Plot Aspect Ratio.

Most of the other elements in this menu are options that you activate or de-activate by clicking on them. The selections are marked with a dot on the left of the menu item when activated. Note that the menu items ending with three dots open a dialog box.

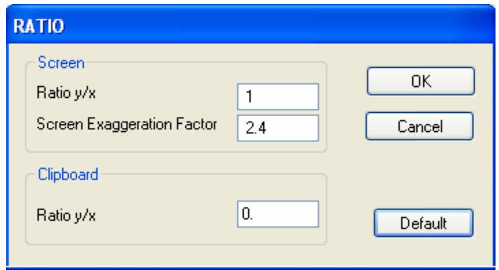


6.11.1 Grid Options

When **Grid Options** is selected, the following dialog box is displayed. This dialog box contains all the options available to adjust your grid. You will notice that several of them are also available as menu options for quick toggling after you have prepared your plot workspace.



Apply	To apply the changes without closing the dialog box.
OK	To apply the changes made in the dialog box.
Cancel	To close the window without applying changes.
Save as Default	The next time you create a study all the Grid options selected will be used.
Load Default	Loads the default values that were saved the last time Save as default was clicked. Useful for existing studies in which you would like to use the default values you set.
Color	To adjust the colors of the background, the grid, the contour and the Title Block. Make your selection from the drop down menu. See also **File > Preferences > Color** (see section 3.10.3 Colors).

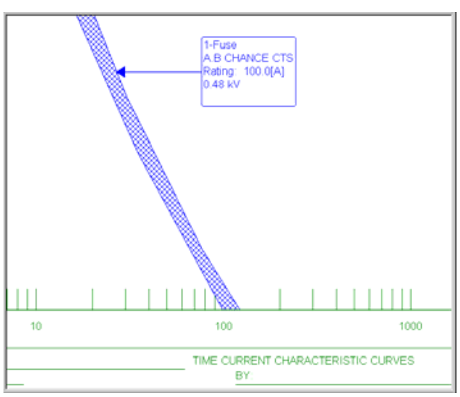
Fonts	To change the font of the grid elements (scale and tags) and of the title block information. Make your selection from the drop down menu. **See also File > Preferences > Font** (see section 3.10.4)
Aspect Ratio	 **Ratio y/x :** Ratio for each decade. **Screen Enlargment Factor :** Not used. **Clipboard Ratio y/x :** Not used.

Scale Group Box (and Plot Sub-Menu Options)

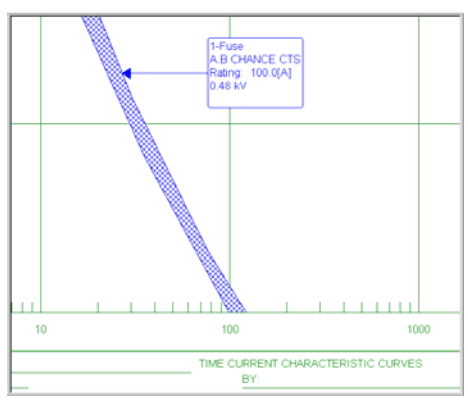
Simple Scale	Shows the value of each tenth grid line in the scale of the grid. This is the default setting.
Full Scale	Shows the value of every grid line of the Full Grid. To avoid overlap, you may have to choose a small character size under **File > Preferences > Font** (Section 3.10.4).

Grid Group Box (and Plot Sub-Menu Options)

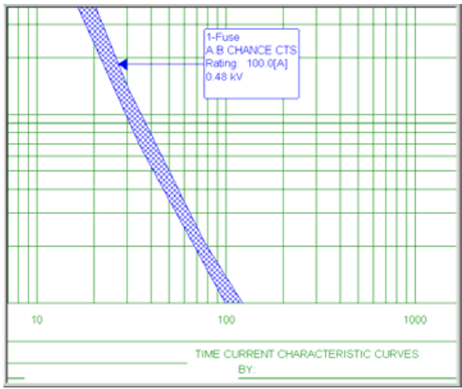
Simple Grid	To hide the grid lines, and show only tick marks along the X and Y scales.
Standard Grid	To show grid lines at every tenth value of the scale.
Full Grid	To show ten grid lines per decade.
K & E Grid	To show 100 grid lines per decade, mimicking the Keuffel & Esser paper.



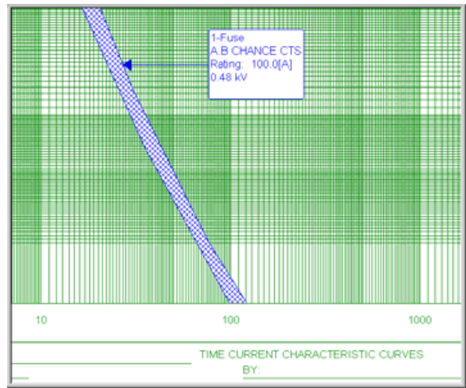
Simple Grid



Standard Grid



Full Grid



K&E Grid

X Scale Group Box (and Sub-Menu Options)

Amperes	Displays the current scale in Amperes.
MVA	Displays the current scale in MVA (MVA = current *device voltage * √3). The current is expressed in kA and the device voltage in kV.

X Multiplier Group Box (and Sub-Menu Options)

X Multiplier allows you to multiply the printed scale (0.5 to 10000 A) by any of the five factors shown (0.1 to 1000). The **Display Amps Multiplier** check box allows displaying at the top of the Curve Plot the study Plotting Voltage with the selected multiplier. (The Plotting Voltage for the study can be modified through the **Options** > **Title Block Information** dialog box (section 8.15)

Note that the corresponding Plot sub-menu options provide **x1**, **x10** and **x100**. The Plot Toolbar (section 1.6.4) comprises icons for **x1**, **x10** and **x100** as well.

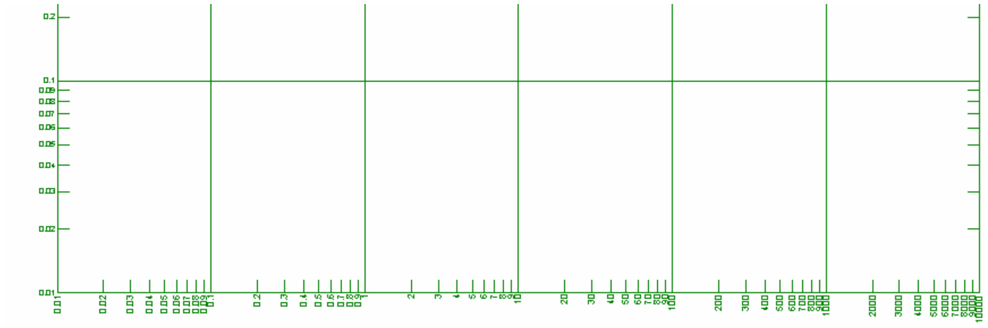
Cycle Factor Group Box (and Sub-Menu Options)

Cycle Factor allows choosing between 50 or 60 Hz.

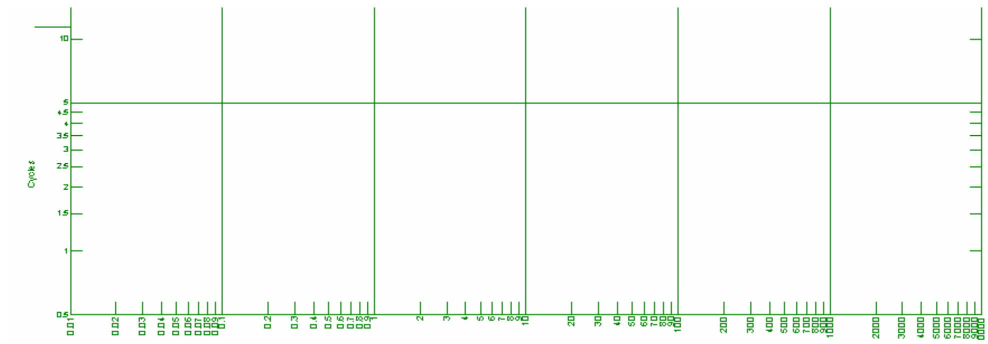
Y Scale Group Box

To display the Y scale of the graphic in Seconds only or in Seconds with Cycles (shown on the left of the graphic).

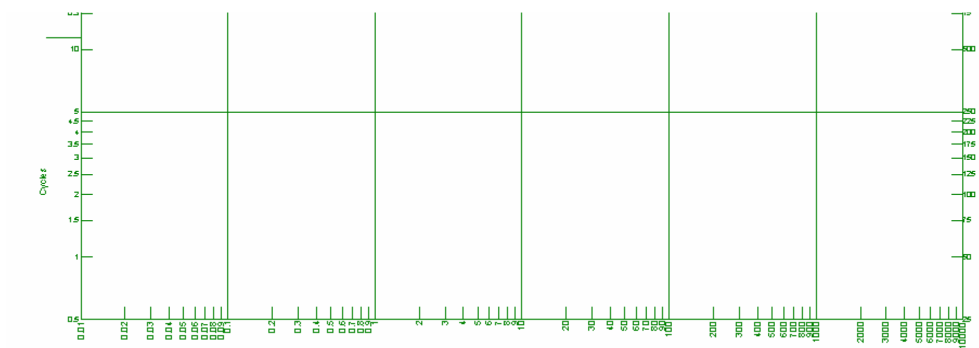
Checking the checkbox next to **Display cycle legend**, will display the Y scale to the right of the graphic as well.



Seconds only (left)



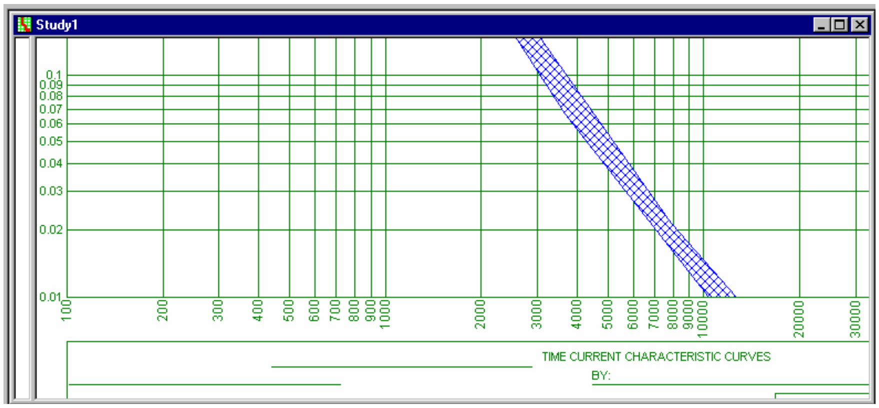
Seconds + Cycles (left)



Display cycle legend (right)

X Limits and Y Limits Group Boxes

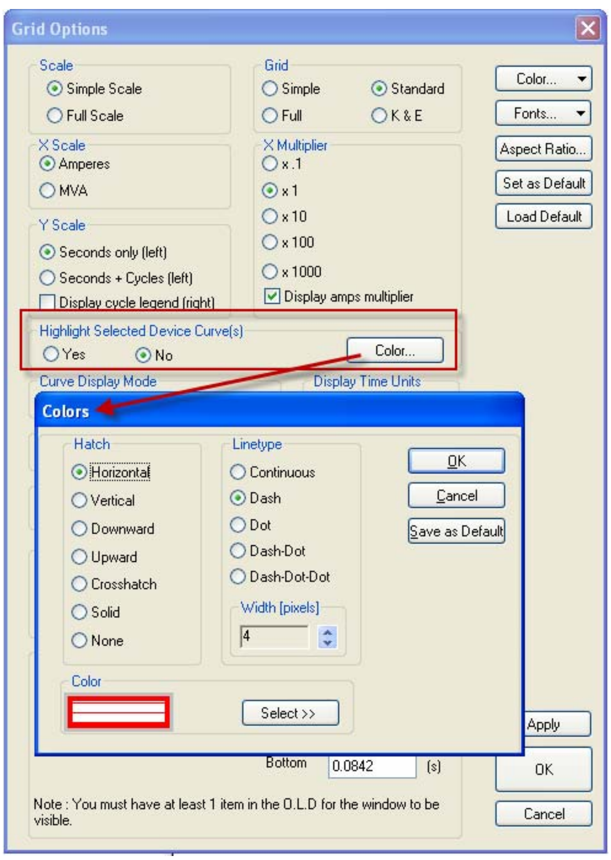
X limits and Y limits allow you to change the minimum and maximum values on the current and time scales respectively.

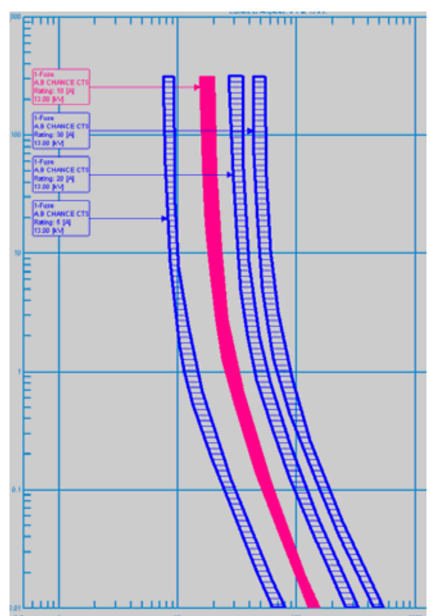


Example: Current Scale ranges from 100 A to 100000 A

Highlight Selected Curve(s) Group Box

If that option is set to **Yes**, the selected curve will be drawn based with the **Color** selected.





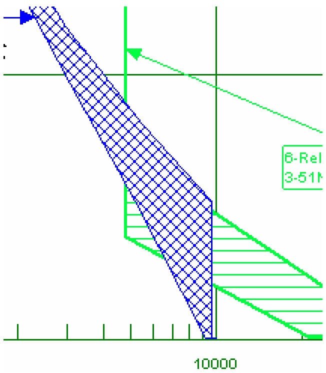
Line Thickness Group Box

This option is used to modify the line thickness between the tag and the curve of all the tags in the current study. The line thickness can be set from 1 to 10 units.

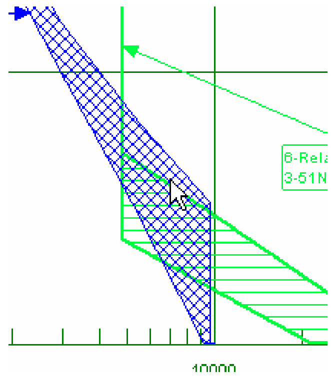
This parameter is saved directly in the study. So the next time you open that study, the line thickness will be as set before.

Curve Display Mode

Opaque	Ensures that where two or more curves overlap, the more recently created curve is displayed on top. The others are hidden behind it. As well, the grid lines are not visible behind any curve.
Transparent	Makes all overlapping curves visible where they overlap. Grid lines are visible behind all curves.



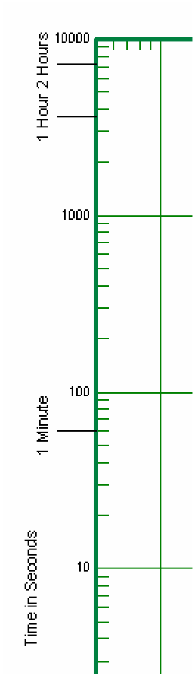
Curve Opaque



Curve Transparent

Display Time Unit

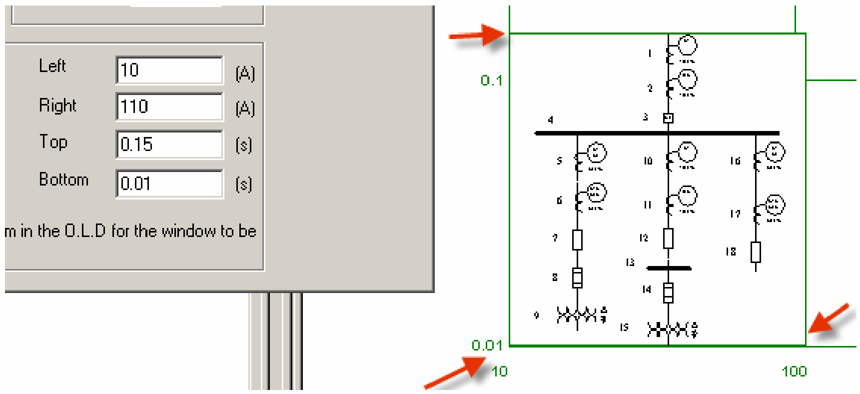
Gives you the possibility to add a marker at 1 minute, 1 hour or 2 hours on the Y scale.



<u>**One Line Diagram Window Plot in Window Group Box (and sub-menu command)**</u>

The commands in this group box allow showing or hiding the one-line diagram in the Curve Plot workspace (mainly for printing purposes).

The group box commands allow adjusting where within the Curve Plot space the OLD will be shown. The measurements indicated are based on the scale of the curve.



6.11.2 Layout Mode

Selecting **Layout Mode** shows the Curve Plot as it would appear if printed. The device tags are shown at their proper size, shape and contents. When not in Layout Mode, the tags appear with a summarized content and with a larger font for better readability on the computer screen.

The Layout Mode can also be activated by selecting the **Page Layout** toolbar button .

6.11.3 Other Plot Sub-Menu Options

<u>**Cursor Sub-Menu Commands**</u>

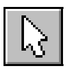
Cursor (Seconds)	To display the time coordinate of the cursor position in seconds.
Cursor (Cycles)	To display the time coordinate of the cursor position in cycles.

Chapter 7 The Mode Menu

7.1 Introduction

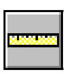
This menu controls what the cursor modes applicable in the Curve Plot workspace. These commands are also available through icons on the **Plot** Toolbar (Section 1.6.4); selecting a mode option in the menu has the same behavior and effect than selecting the corresponding icon in the Plot Toolbar. All modes allow you to select devices by left-clicking on the One Line symbols.

7.2 Track

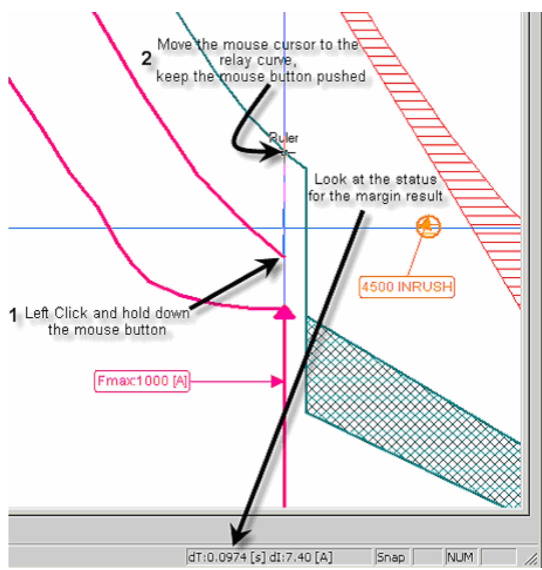

Returns the mouse mode to **Tracking**. The coordinates of the position of the cursor are continuously displayed in the Status Bar at the bottom right corner of the screen. The coordinates are {Time; Current} when the cursor is in the Curve Plot window, and they are (x; y) when the cursor is in the One Line window.

Left-clicking on a curve selects it. The selection is reflected in the Status Bar and in the Device List located in the Main Toolbar (section 1.6.3).

7.3 Ruler


Puts the mouse mode to **Ruler**. In this mode, the mouse becomes a measuring device. It is used to measure the difference in time and/or current between two points on the curve plot. The results are displayed in the Status Bar.

1. Click the left mouse button once at the first point and hold it down.
2. Slide the mouse to the other point. (A dashed line extends to the cursor location)
3. Read the difference in time and current in the Status Bar.



As long as you hold down the mouse button, the difference in time and current between the original point and the cursor location is displayed in the Status Bar and in the Main toolbar. This mode offers a quick way to evaluate coordination margins manually.

<u>Hint</u>:	**Ortho** Mode. To make the cursor move horizontally and vertically only, press and hold down the Shift key before you click and drag the mouse.

<u>Note</u>:	In **Ruler** mode, you cannot select a device by clicking on its Identification Tag or curve in the Curve Plot window.

Select the **Track** mode when you want to exit the **Ruler** mode.

Chapter 8 The Options Menu

8.1 Show Fault Arrow

Globally enables and disables the display of vertical arrows which indicate the maximum fault current defined for each device (see section 5.3.6). Arrows will be displayed only for those devices for which you have requested them.

8.2 Show Response Curve

Globally enables and disables the plotting of the response curves of reclosers. Response curves will be displayed for the Reclosers for which you have enabled the **Response** curve option in the respective dialog box (See section 5.5).

8.3 Show Response Curve Tag

Globally enables and disables the tags on the response curves of Reclosers (Section 5.5). Response curves tags will be displayed for those reclosers for which you have activated them.

8.4 Show Margin Anchor

Globally enables and disables the Margin Anchor (See 10.2.3).

8.5 Display Device Number in Plot

Includes the device number (1, 2, 3...) in the identification Tags when the option page Layout Mode is **not** selected. (See 6.11.2)

8.6 Display Device Type in Plot

Includes the type of device (e.g., fuse) in the identification Tags when the option page Layout Mode is **not** selected.

8.7 Display Device ID in plot

Includes the Device ID (Section 5.3.2) in the identification Tags when the option page Layout Mode is **not** selected.

8.8 Display Device Settings in plot

Includes the device settings in the identification Tags when the page Layout Mode  (Section 6.11.2) is selected.

8.9 Display Device Number in OLD

Displays the device numbers in the One-line diagram next to the symbols.

8.10 Display Device Type in OLD

Displays the type of device (e.g., fuse) next to the symbols in the One-line diagram.

8.11 Display Device ID in OLD

Displays the Device ID (Section 5.3.2) next to the symbols in the One-line.

8.12 Display Device Settings in OLD

Displays the Device settings (e.g., relay tap, etc.) next to the symbols in the One-line.

8.13 Show Symbol Label

Displays device descriptions next to symbols in the One-line. (e.g., transformer kVA, switch description, motor HP, bus voltage). See the **Symbol Label** button (Section 5.3.11).

8.14 Show User Label

Globally displays the User Labels you may have defined for symbols on the One Line. (Right-click on the symbol to see a menu from which you may choose to define a label.) Alternatively, use **Edit > Symbol User Label** (see section 2.1.3 OLD Symbol Contextual Menu).

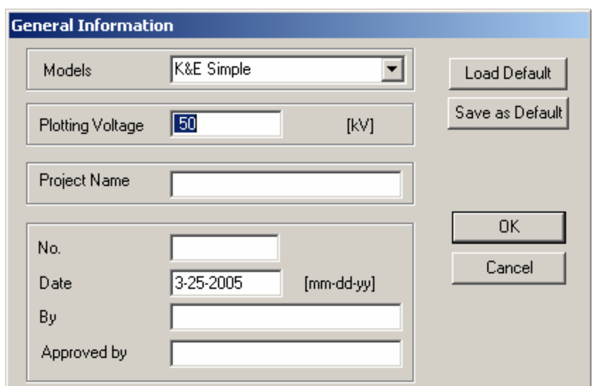
8.15 Title Block Information

Displays the dialog box into which you enter the title block information for the Curve Plot. Four formats are available, two of which may be used when plotting on Keuffel & Esser pre-printed log-log forms.

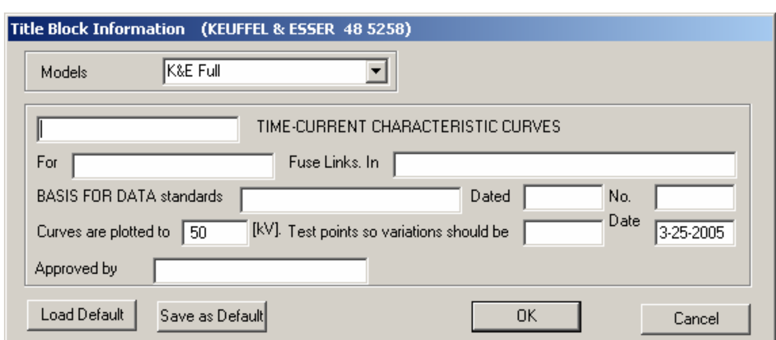
First, use **Options > Title Block** (Section 8.15.1) to select a format.

> **Note**: **Plotting Voltage**
>
> You set the normal plotting voltage in the Plot Toolbar (Section 1.6.4), where there is a list of one or more voltages defined by transformer primary voltages in your study. That list allows you to plot according to currents on one side or the other of each transformer.
>
> You may define an alternate plotting voltage via **Options > Title Block Information**.
>
> CYMTCC automatically shifts device curves left or right along the current axis according to the following formula:
>
> $$I_{plot} = I_{device} \times \frac{\text{Device Rated Voltage}}{\text{Plotting Voltage}}$$

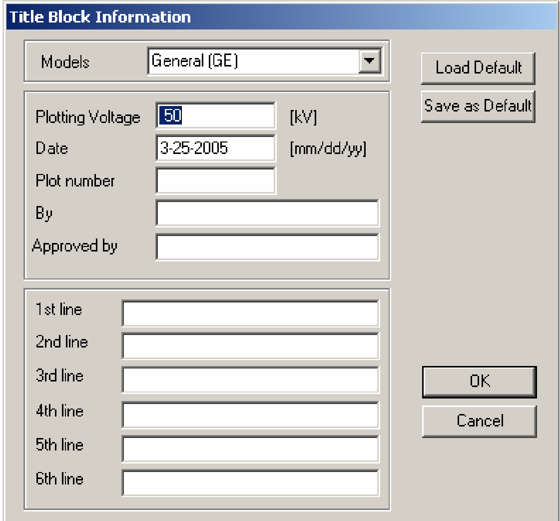
Display the **Title Block Information** dialog box by selecting the menu command or by double-clicking on the title block area on the curve plot area. The following four models are available. Use the **Title Block** menu command to switch from a format model to another.



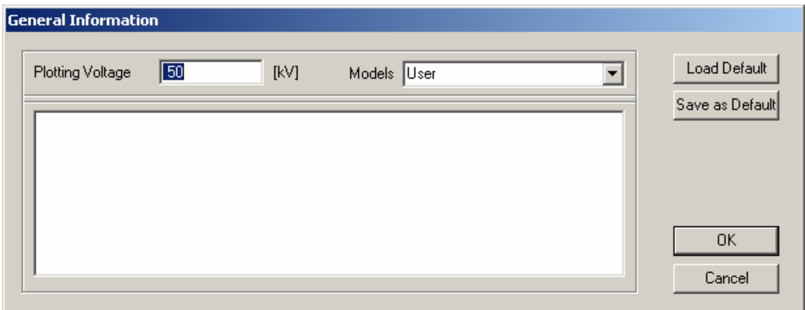
K & E Simple format



K & E Full format



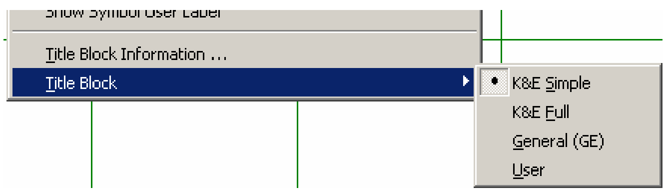
General (GE) format



User-defined format

8.15.1 Title Block Models

Four models are available for the Title Block that is placed at the bottom of the Curve Plot. You can select the model you want from the menu. You can always select another one from any of the **Title Block** dialog boxes.



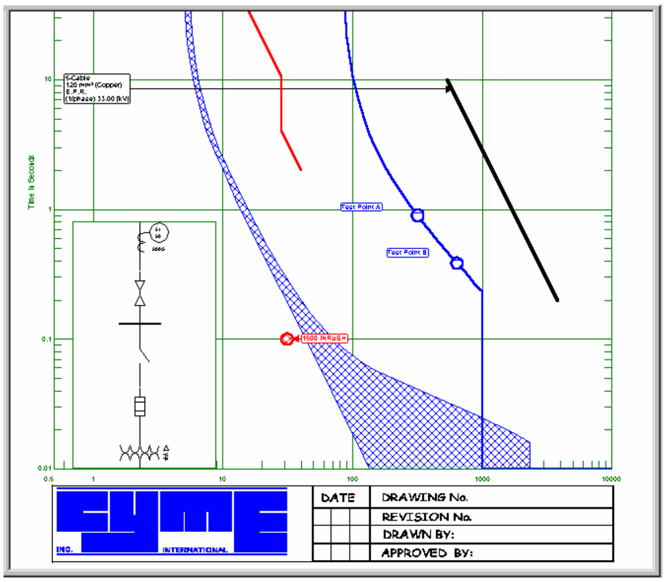
Refer to Section 8.15 Title Block Information for illustrations of the formats.

Hint: To apply your company's standard title block style:

- Draw your title block in AutoCAD, MS Paint, etc.
- Copy your drawing to the Windows clipboard.
- Choose **User Title Block** so that the title block area is left blank.
- Paste your title block. See **Edit > Clipboard > Paste to Plot** (Section 4.14.1).
- Double click in the title block on the plot to open it.

Alternatively, you can use the **Draw** toolbar in CYMTCC's One Line editor to make your title block. Then you can copy and paste it into your Curve Plot and into other studies as well.

Use the Graphic Manager to save your graphic if you want to use it in other studies (see chapter 12.4)



Example of User Title Block pasted in from elsewhere

8.16 Wheel Mouse Click

Enables and disables the functionality of the wheel mouse click. The wheel mouse click enables the zoom in/out on some mice.

Note: This will not work will all mouse brands.

Chapter 9 The Reports Menu

9.1 Do Not Show Hidden Devices in Report

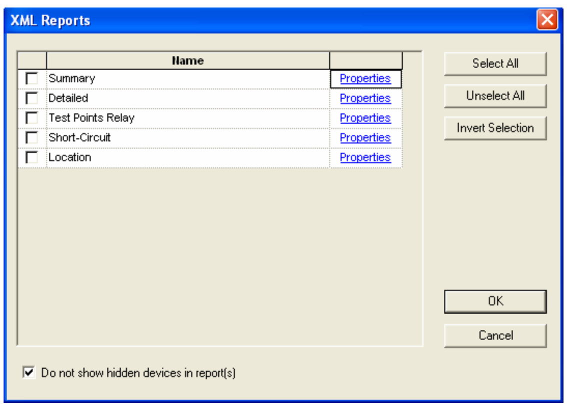
Select this option if you do not want the devices that are currently hidden to be listed in the reports.

9.2 XML Format Reports

Select this menu command to view the **XML Reports** dialog box. Check the **reports** checkbox(es) to select the report(s) you would like to view.

You can change the titles and the look of the reports by clicking on the **Properties** link next to the report name. (**Reports > XML Format > Properties**, section 9.2.1)

Click **OK** to view the selected report(s).

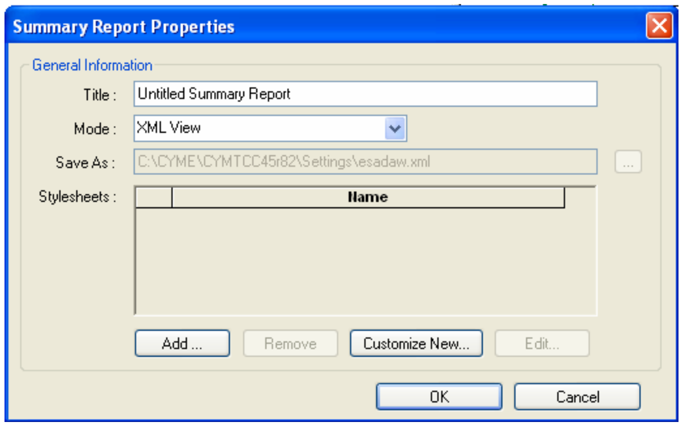


The reports are immediately displayed each in a window of its own. The windows are usually “docked” at the bottom of the screen, but you can relocate them and change their size individually.

Right-click inside the report to display the contextual menu and de-activate the “docking view”.

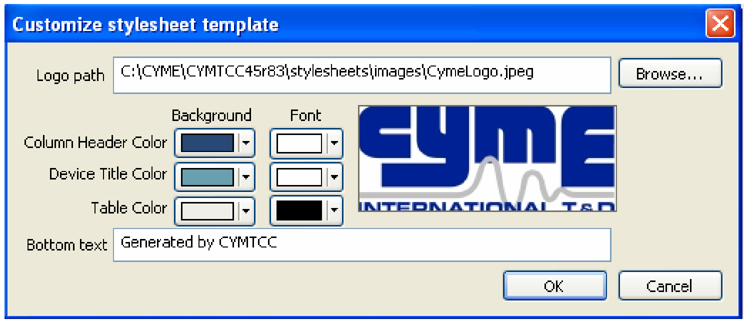
9.2.1 Properties

You can change the look of all the reports (Color, graphics, etc) by editing the XLS files located in the **stylesheets** folder (Same folder as your Cymtcc.exe installation). Some basic knowledge of XML is necessary.

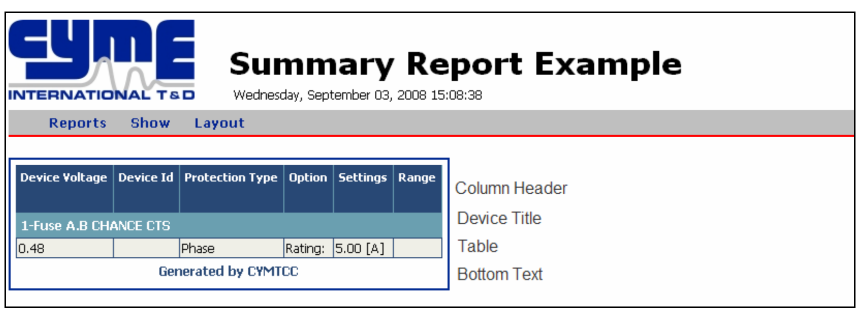


Caption bar	The title on the caption bar will display the name of the report you have clicked on the **Properties** link in the **XML Reports** dialog box.
Title	To enter the title for your report.
Mode	Two choices: **XML View** will output the report within a window in CYMTCC and **XML File** will prompt you to save the report in a file.
Save As	This field is enabled when the **XML File** mode is selected.
Stylesheets	Is a file where custom colors and tiles are saved.
Add	Inserts an existing style sheet.
Remove	Click on an existing style sheet located in the list and click **Remove** to delete the entry from the list.
Customize New	Opens the **Customize** dialog box that allows you to change the output colors of the report. (see 9.2.2 below for more info)
Edit	Click on an existing style sheet to enable the button and click **Edit** to modify it. This opens the same window as **Customize new**.

9.2.2 Customize New



Logo Path	Click the **Browse** button to select your logo. Supported formats include JPEG and BMP. Note that the graphic will not be resized to fit the available space. Try not to exceed 180x80 pixels.
Column Header Color	To select the color of the background and of the font to be used in the column headers (Device Voltage, Device ID, Protection Type, Option, Settings and Range)
Device Title Color	To select the color of the background and of the font to be used for the names of the devices listed in the report.
Table Color	To select the color of the background and of the font to be used for the results table
Bottom Text	To type in the text of the report footer.



9.2.3 Output examples

Summary Report

Friday, January 20, 2006 10:16:41

Reports Show Layout

Device Voltage	Device Id	Protection Type	Option	Settings	Range
1-Fuse KEARNEY 124080					
0.48		Phase	Rating:	12.00 [A]	
2-Recl. KYLE NOVA					
0.48		Phase/Ground			
		Phase element	Pick Up:	560.0 [A]	
			Fast:	106	
			Slow:	114	
			Oper. first TCC:	2	
			Oper. to lockout TCC:	4	
			Setup Fast (100p):	Const. Time Add.(102)	0.00 [s]
				Multiplier(103):	1.00 [cycle]
				Min. Resp. Time(104):	0
		Ground element	Pick Up:	200.0 [A]	
			Fast:	ANSI VI (1)	
			Slow:	119	
			Oper. first TCC:	2	
			Oper. to lockout TCC:	4	
		Sequence	Reset Time	30.00 [s]	
			Reclosing Time:	2.0 /2.0 /5.0 [s]	
3-Relay WEST CO-9					
0.48		Phase	TD:	3.0	
			Tap Range:	[0.05 / 2.4]	
			Tap:	1.00	
			CT:	600 :5	
			Pick Up:	120.00 [A]	

Report generated by Cymtcc 4.5, CYME International T&D

Detailed Report

Friday, January 20, 2006 10:16:41

Reports Show Layout

Fuse

Substation Name	SUB1
Feeder Name	F1
Section Name	EQ-98745
Short Circuit Minimum [A]	211
Short Circuit Maximum [A]	2345
Type	KEARNEY 124080
Device Voltage (kV)	0.48

Option	
Rating	12
Fuse In Parallel	OFF

Project Name
By
Date
Approved by

Recloser Electronic Cooper Form 4C

Substation Name	SUB1		
Feeder Name	F1		
Section Name	EQ-9856		
Short Circuit Minimum [A]	234		
Short Circuit Maximum [A]	4567		
Type	KYLE NOVA		
Group	1		
Device Voltage (kV)	0.48		
Nominal Voltage (kV)	25.0		

Option		Phase	Ground
(01) Trip Rating		560.0	200.0
(02) TCC #1		106	ANSI VI (1)
(03) TCC #2		114	119
(04) Operation First TCC		2	2
(05) Operation Lockout		4	4
(06) Reset Time [sec]		30.00	
(07) Reclosing Time 1 [sec]	2.0		
(08) Reclosing Time 2 [sec]	2.0		
(09) Reclosing Time 3 [sec]	5.0		

CYME INTERNATIONAL T&D

Location Report

Friday, January 20, 2006 10:16:42

Reports Show Layout

Device Name	Device Voltage	Protection Type	Substation Name	Feeder Name	Device Id	Setting ID
1-FUSE KEARNEY 124080	0.4800	Phase	SUB1	F1	EQ-98745	EQ-9632
2-RECLOSER_4C KYLE NOVA	0.4800	Phase/Ground	SUB1	F1	EQ-9856	EQ-9857
3-RELAY WEST CO-9	0.4800	Phase	SUB2	F1-9666	EQ-9851	EQ-96321

Report generated by Cymtcc 4.5, CYME International T&D

CYME INTERNATIONAL T&D

Test Points Relay Report

Friday, January 20, 2006 10:16:41

Reports Show Layout

#	p.u.	Current A	Opening Time sec
3-RELAY WEST CO-9 (Phase)			
1	2.0000	240.0000	4.4166
2	5.0000	600.0000	0.7287
3	8.0000	960.0000	0.7287
4	9.0000	1080.0000	0.4177

Report generated by Cymtcc 4.5, CYME International T&D

CYME INTERNATIONAL T&D

Short-Circuit Report

Friday, January 20, 2006 10:16:42

Reports Show Layout

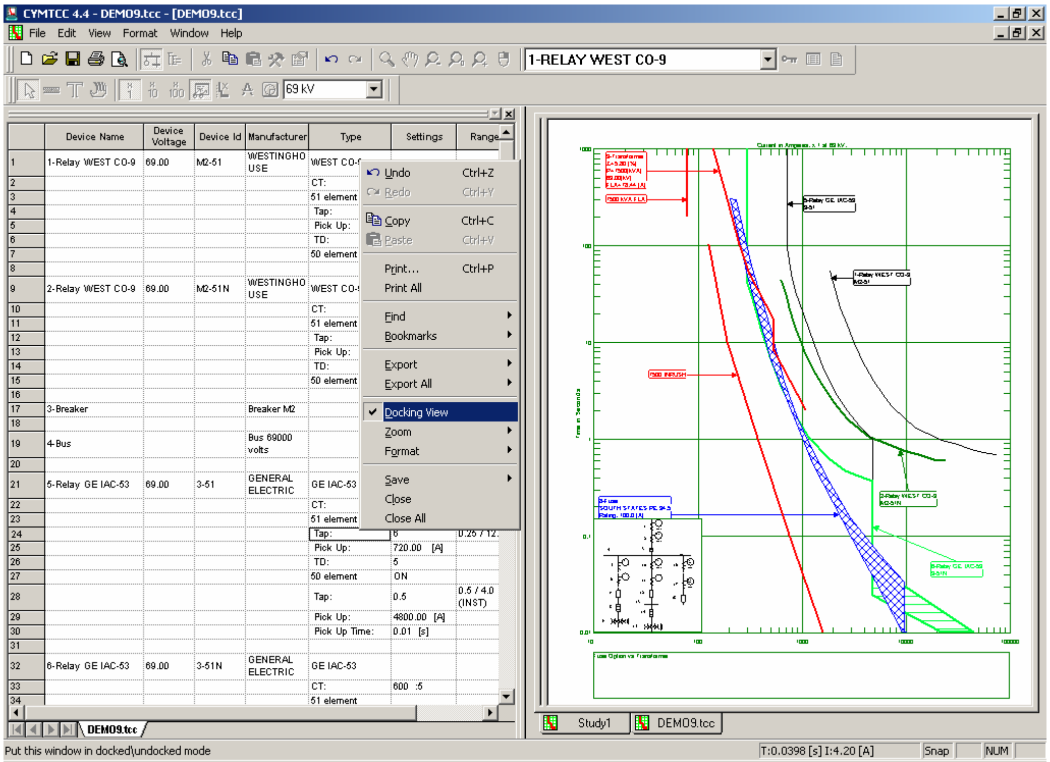
					Symmetrical			
Device Name	Device Voltage	Protection Type	Min	Max	LG	LLG	LL	LLL
1-FUSE KEARNEY 124080	0.4800	Phase	211	2345	211	314	1234	2345
2-RECLOSER_4C KYLE NOVA	0.4800	Phase/Ground	234	4567	234	238	2345	4567
3-RELAY WEST CO-9	0.4800	Phase	345	9876	345	349	6543	9876

Report generated by Cymtcc 4.5, CYME International T&D

9.3 Summary (Tabular)

Select this menu command to create a spreadsheet report listing the settings of all the devices in the active study. Each device is numbered according to its position in the One Line of the study.

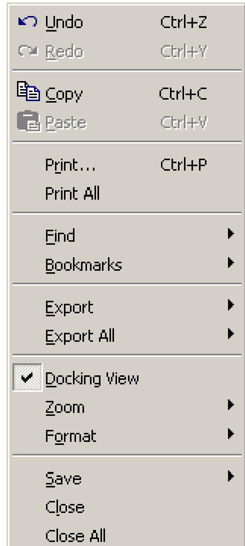
The report is immediately displayed in a window of its own. This window is usually "docked" at the bottom of the screen, but you can relocate it and change its size. Right-click inside the report to display the contextual menu and de-activate the "docking view".



Sample Summary Report, docked next to the study window

You can change the width of the columns by clicking and dragging the edges of the column headers.

With the commands in the contextual menu, you can print, export and save the report.



Copy	Allows you to copy portions of the text to the Windows clipboard. Select entire rows by clicking (left) and dragging the mouse cursor over the row labels (A, B, C,.etc.) at the extreme left. Select entire columns by clicking on the column header.
Print	To print your report.
Find	Allows you to search a column for a text. Select a column by clicking on any cell inside it. Choose **Find** and enter the text you want to find. You can specify that the search proceeds upwards or downwards from the selected cell.
Export	Sends the table to Microsoft Excel or Internet Explorer, where you may save the report as an Excel spreadsheet or HTML format document.
Docking View	Fixes the location of the report window, fitting it below or to one side of other windows. De-activate this option to make the window "float" so that you may re-size and move it.
Zoom	Allows you to magnify the text inside the window or make it smaller to fit better.
Format	Lets you align (left, right, center), change style (bold, italic, underline). Avoid using the row and column resize functions: you are better off clicking and dragging the edges of row and column headers.
Save	Will save to comma-separated-variable format. Use the Export to Excel instead.
Close	Will close the report (page). **Close All** will close all open reports. (Actually, the reports appear as separate pages in a spreadsheet.)

9.4 Detail (Tabular)

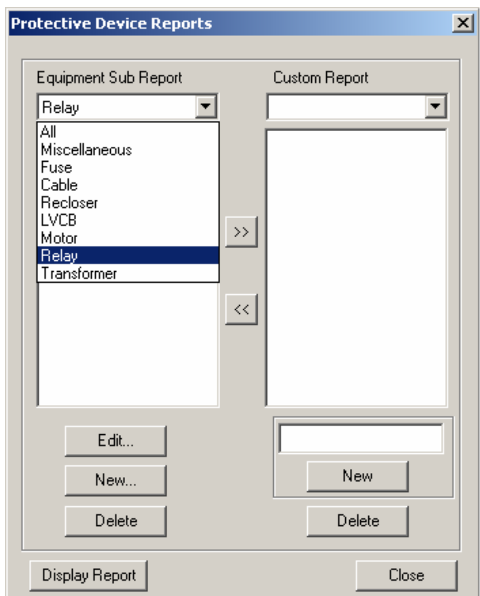
Creates a spreadsheet report containing the:

- Details of all the protective devices in your study (like the Summary Report)
- Location information (Substation, Feeder and Section names)
- Minimum and maximum fault currents

9.5 View Custom Report

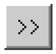
Creates a spreadsheet report containing the information contains in the selected custom report. (See section 9.6 Editor)

Note: The report will display the information of one study. Make sure the proper study is selected before displaying the desired report.

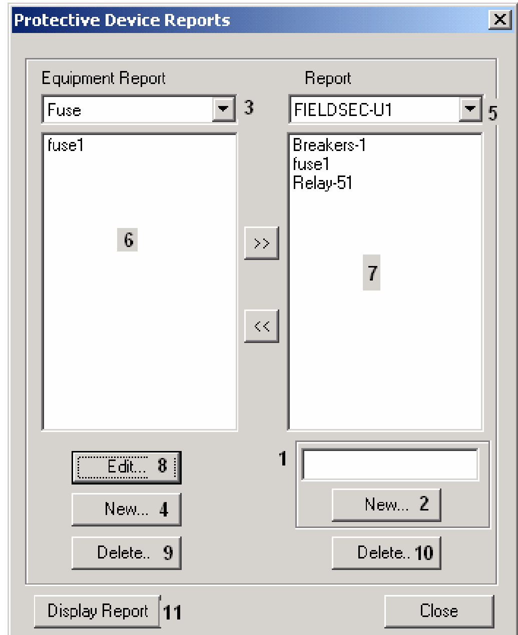


9.6 Editor

This function is used to create custom reports. The left side of the dialog box allows you to create the **Equipment Report**s, which are the subdivisions of the **Report**. You need to create an equipment report for each device type you would like to see in your custom report.

Once done, you can transfer them to the right side, **Report**, using the 

button or by double clicking on the equipment report name. A custom report is composed of one or several equipment reports.

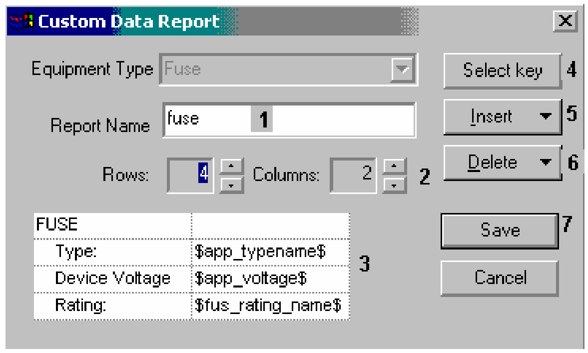


1. Enter a Report Name in the box below the **Report** fields.
2. Click the **New** button right underneath it; this will be the report that will contain all the equipment sub-reports you will specify in the next steps.
3. To create an **Equipment** sub-report, select a type in the drop down list.
4. Click the **New** button at the bottom left to open the **Custom Data Report** dialog box corresponding to the equipment selected. (See 9.6.1 Report Editor to learn how to do this customization).

Other functions in the Protective Device Reports dialog box

5. List of all custom reports.
6. Displays each Equipment type report (sorted by type (select “all” at #3 to see the complete list)
7. Display all equipment sub report attach to a custom report.
8. **Edit** the selected equipment sub report, this will open the **Custom Data Report** dialog box with the proper structure. (see 9.6.1 Report Editor).
9. **Delete** the selected equipment sub report (if the selected item is included in a custom report, this operation will not be valid).
10. **Delete** the selected custom report.
11. **Display** the selected custom report.

9.6.1 Report Editor



The **Custom Data Report** dialog box is displayed when you click the **Edit** button in the **Protective Device Reports** dialog box (or the **New** button if creating a new one). This dialog box is used to define the values you want to have in your custom report for each device type.

1. Enter a **Report name**.
2. Increase or decrease the number of **Rows** and **Columns**.
3. Enter or modify the equipment type report parameters.
4. To insert keywords, position the cursor in a cell and click the **Select key** button. This will display the **Keyword Selection** dialog box. Highlight the keyword wanted and click **OK** in that dialog. The keyword will be displayed in the selected cell.
5. Click on **Insert** to add a line or column.
6. Click on **Delete** to remove a line or column.
7. Press **Save** to validate.

9.7 View Custom Report

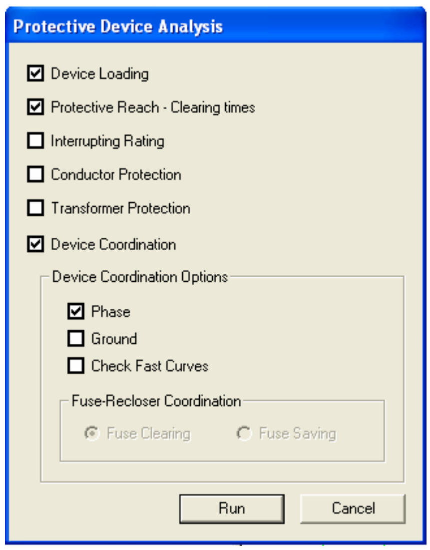
The entries below the **Reports > Editor** command are the reports created with the Custom report editor (see 9.6).

Note:	The report will display the information of one study. Make sure the proper study is selected before displaying the desired report.

Chapter 10 The Analysis Menu

10.1 Protective Device Analysis

Use the **Analysis** > **Protective Device Analysis** menu command to verify whether the device curves in the study are coordinated, according to the criteria defined for them.



Enable the checkbox(es) (☑) of the different criteria to select those that you want to evaluate.

You can evaluate phase and ground protection coordination independently. Ground (neutral) relays and recloser curves are compared with each other only. Their curves are not compared to the phase protection device curves.

Click **Run** to run the analysis.

<u>To Make a Manual Adjustment</u>

In any of the reports, click on the device name (in blue) to open the corresponding device settings dialog box, where you can modify the device as needed. When the **Draw** or the **Apply** button is clicked, the report will be automatically updated to reflect the modification.

You can also use the **Fast Adjust Tab** of the Multi-Explorer to change the settings of the curve (See chapter 16.8 for more information).

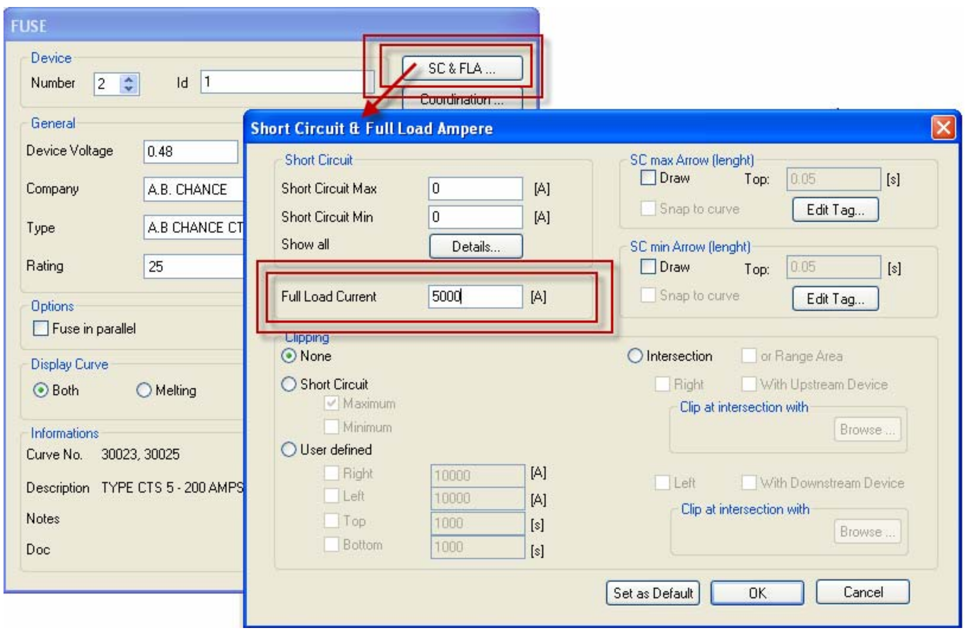
10.1.1 Protective Device Loading Report

Protective Device Loading Report					
Node	Setting ID	Device Name	Size/Trip [Amps]	Percent Loaded	Description
S001		1-FUSE COOPER T-TIN	100.00	21.0	FLA = 21.00. Not Exceeding the 80.00 percent limit of pick up current.
S002		2-FUSE COOPER T-TIN	20.00	180.0	FLA = 36.00. Exceeding the 80.00 percent limit of pick up current.
S003		3-FUSE COOPER T-TIN	40.00	262.5	FLA = 105.00. Exceeding the 80.00 percent limit of pick up current.

For the devices where the FLA exceeds the device loading (%), their description will be shown in red in the report.

To modify the device loading allowed value, select the menu option **Analysis** > **Reach and Load Criteria** (Section 10.5). Select the device type and enter the % in the **device loading** field.

The device must contain its **Full Load Current** value. To enter it, use the **SC&FLA** button available in the **Device Properties** dialog box.



Errors are displayed in red the **Description** column.

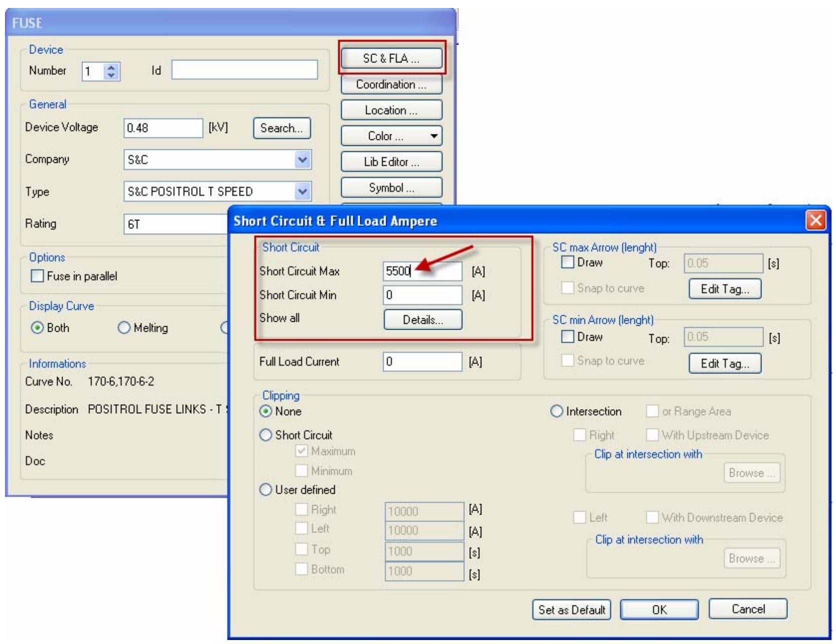
10.1.2 Protective Reach Report

Protective Device Clearing Times Report					
Node	Setting ID	Device Name	Size/Trip [Amps]	Total Clear Cycles	Description
SECT001	FU1	1-FUSE MCGRAW K-SILVER	20.00	14.7	Protecting Reach for type Fuse set to 60.00 cycles.
SECT002	ELRE1	2-RELAY ABB DPU 2000R EI	168.00	Out of range!	Protecting Reach for type Electronic Relay set to 50.00 cycles.

For the device that exceeds the maximum permitted operating time ("Reach"), its description will be shown in red the report.

To modify the protective reach value, select the menu option **Analysis** > **Reach and Load Criteria** (Section 10.5). Select the device type and enter the value in cycles in the protective "**Reach**" field.

The verification is done at the Short-Circuit maximum set in the device. To enter it, use the **SC&FLA** button available in the **Device Properties** dialog box.

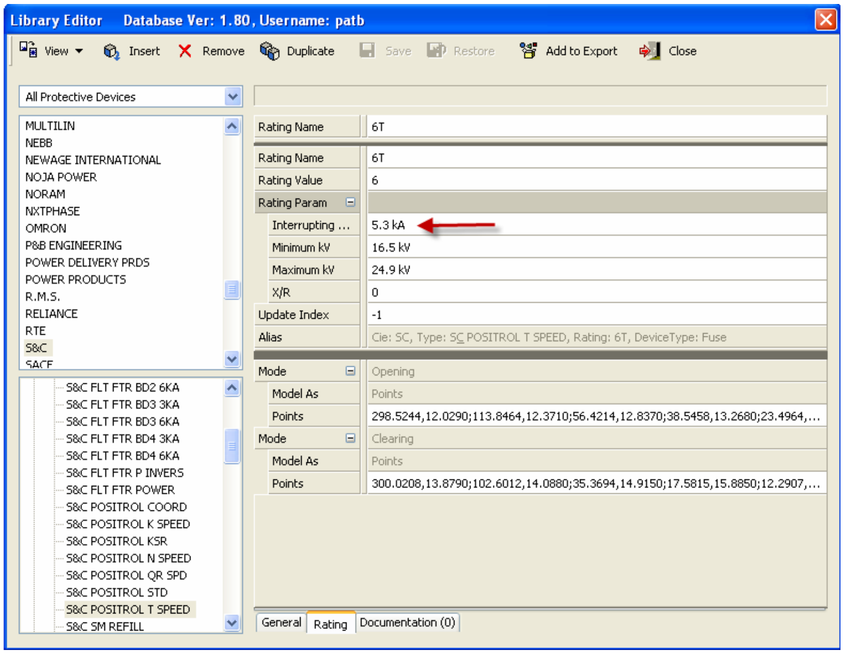


Errors are displayed in red the **Description** column.

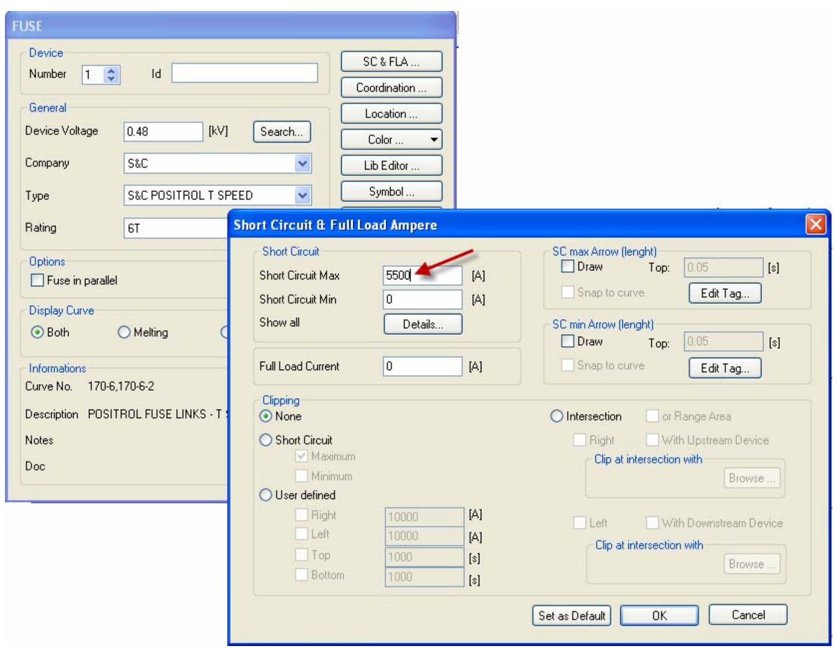
10.1.3 Interrupting Rating Report

It verifies that the short circuit current of a device does not exceed the Interrupting Rating.

The **Interrupting** value can be added using the **Library Editor** (see 13.3).



The **Short-Circuit** maximum value needs to be added in the device using the SC&FLA button available in each of the **Device Properties** dialog box.



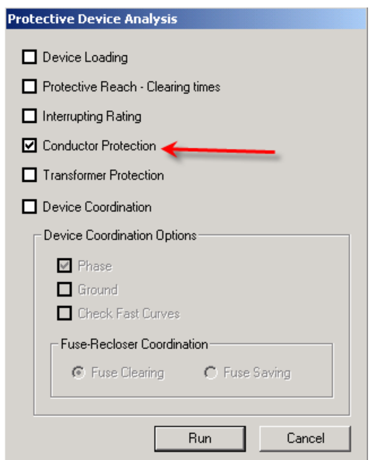
Protective Device Interrupting Rating Report						
Protection	Location	Setting ID	Device Name	Interupting Rating [Amps]	Short Circuit Max [Amps]	Description
Phase			1-FUSE S&C POSITROL T SPEED	5300.00	5500.0	Warning: Interrupting rating 5300.00[A] > Short Circuit value 5500.00 [A]

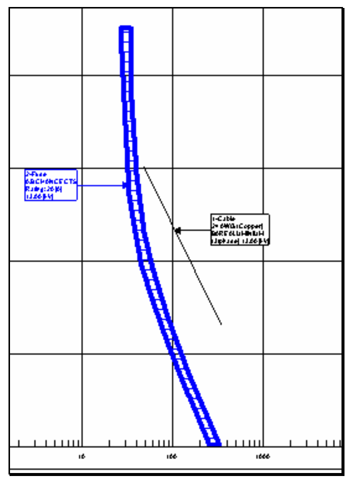
Note:	Since the Interrupting rating is not yet available in the database, this report will not give the right results.

10.1.4 Conductor Protection

The **Analysis** ensures that the cable curve is protected on all its width.

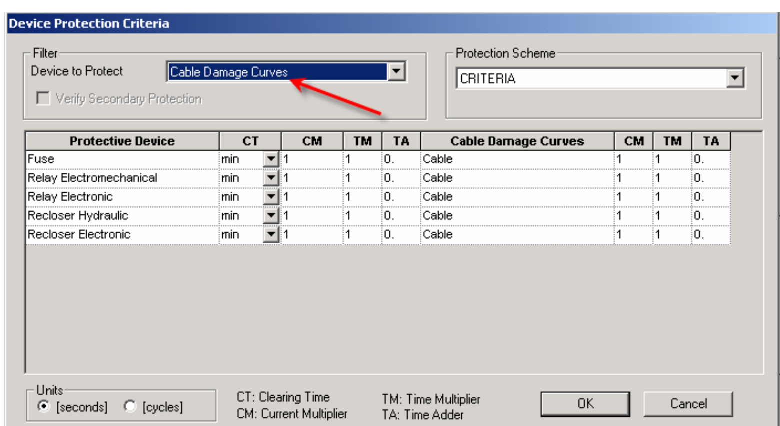
Note:	The device protecting the conductor is the device with the **number** following the cable **number**.





Cable/Conductor Protection Report									
Protection	Pair	Status	Sections		Device Pair Names		Protection Range [Amps]		Description
			Cable	Protective Device	Cable	Protective Device			
Conductor	1	●	c	sec785	1-CABLE 20 AWG	2-FUSE A B CHANCE CTS	26.45	155.18	Cable protected

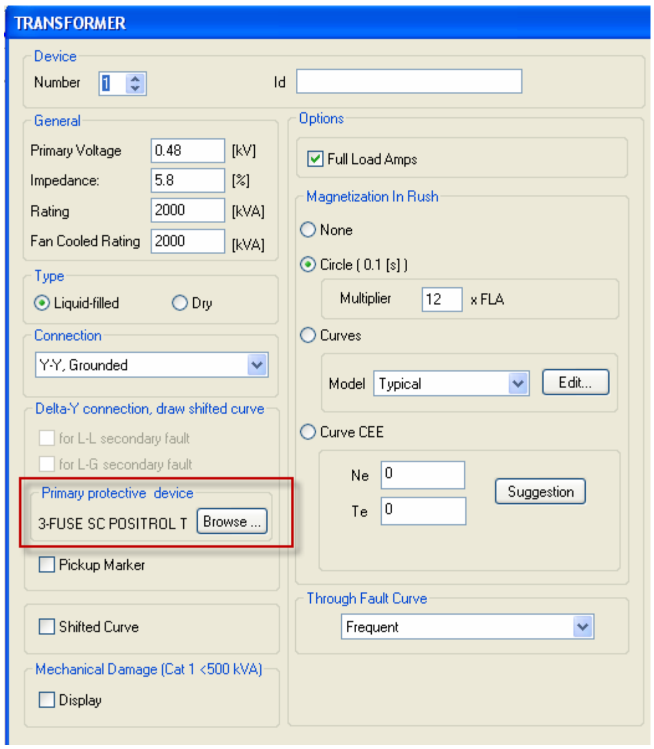
You can specify a separation criteria in the **Device Protection Criteria** dialog box displayed when selecting the **Analysis > Protection Criteria** menu item (section 10.6).



10.1.5 Transformer Protection Report

Verifies if the device curve protecting your transformer is passing the full load and the in rush and if it will interrupt the current before the damage curve is reached.

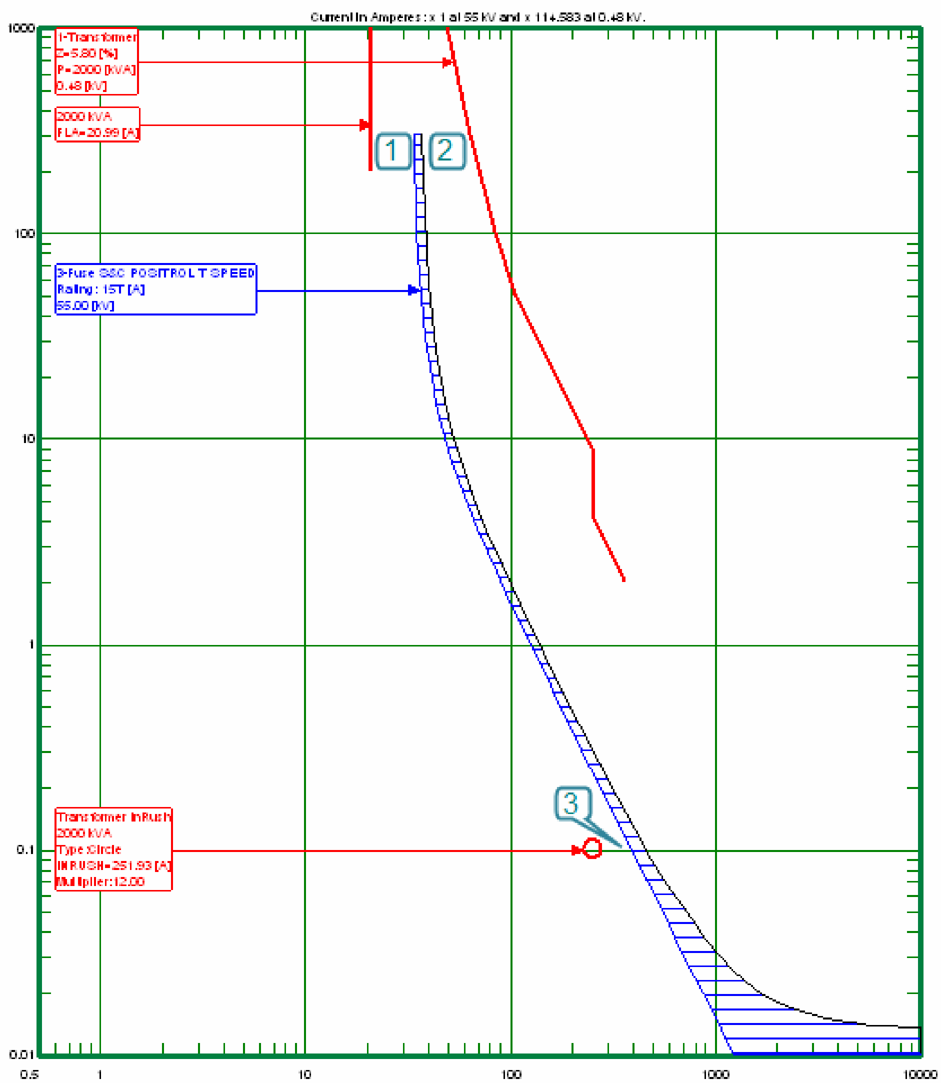
You need to make sure that you have selected your **Primary protective device** in the **Transformer** dialog box.



You can see the results in the protection report, as shown below.

Transformer Protection Report								
Transformer Primary Protective Device				Transformer Information				
Name	Setting ID	Location	Size/Trip [Amps]	Transformer ID	Location	Full Load	Inrush	Damage Curve
3-FUSE S&C POSITROL T SPEED			30.00					

1. The device curve protecting your transformer is passing the **Full Load**.
2. The device interrupts the current before the **Damage curve** is reached.
3. The device curve protecting your transformer is passing the **Inrush**.



10.1.6 Device Coordination Report

Protective Device Coordination Report										
Protection	Pair	Status	Sections		Device Pair Names		Protection Range [Amps]		Description	Anchor
			Downstream	Upstream	Downstream	Upstream				
Phase	1				1-LVCB_MOLDED SQ D LI 350-400A	3-LVCB_STAT SQ D MICRO A/P/H	686.32	16560.0002	No intersection found	Margin Anchor
Phase	2				3-LVCB_STAT SQ D MICRO A/P/H	6-LVCB_STAT SQ D MICRO A/P/H	1419.36	37000.0008	No intersection found	Margin Anchor

This option allows you to view if the desired, clearances between successive pairs of devices (by device number), is respected.

Order of the devices

To make the analysis, CYMTCC will start by using the smallest device number in the study and verify it against the next smallest number available.

Only the “Protective devices” will be used (Fuse, Reclosers, Relays and LVCB). When a device is not categorized as a protective device (Cable, Transformer, Motor, Miscellaneous, margin Anchor or GraphInfo(Line, circle, text)), it will be skipped.

To change the order, use the renumbering option under the **Coordination Tab** (see section 16.5) of the Multi Explorer.

<u>How the analysis is done</u>

For each pair to be analyzed, CYMTCC finds the proper criteria (See Coordination Criteria in chapter 10.4), applies the values on each curve and verifies if the modified curves intersect. It also makes sure the downstream device will operate first.

<u>Important</u>:	The curves will be analyzed as they are shown on the plot. If you used the clipping options (See Chapter 5.3.6) to remove part of the curve, the portion you have removed will not be analyzed.

<u>Note</u>:	The curves in your study will not be modified when you run an analysis, everything is done in memory. It is possible to view the modified curves by using Show Coordination Curves Based on Criteria (see 10.7).

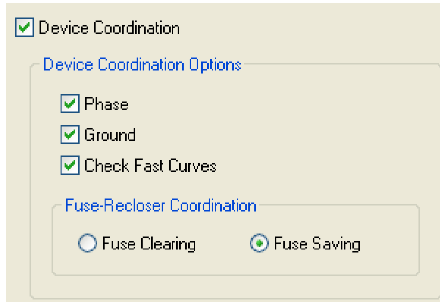
<u>Report Description</u>

Each line of the report gives you an analysis of each pair of device:

- The **Protection** column identifies if the pair analyzes is from a Phase or Ground Analysis.
- The **Pair** column is increased by one at each line. For information purposes.
- The **Status** column will display a red dot for “failed” or a green dot for “passed” depending on the result of the device pair analysis.
- The **Sections** column displays the name of the section ID (see **Create > Common > Location**, section 5.3.7) of the downstream and upstream devices of the pair.
- The **Device Pair Names** is showing the name of the actual downstream and upstream devices.
- The **Protection Range** shows the range where the curves are analyzed. It is usually the pickup of the downstream device and the maximum point of the upstream curve.
- The **Description** column gives the intersection where you might have a coordination problem. That description will be displayed in blue as it is a link that when clicked will display the time-current point of the problem directly on the Plot. If the analysis was successful, the message will display “No Intersection Found”.
- In the **Anchor** column you will find a margin anchor button. Click on it to open the margin anchor option. The proper devices are selected and the option is automatically set to “User defined” and uses the downstream “Short-Circuit maximum” as the anchor point. Of course, you can change any of the parameters before clicking the **Draw** button.

  See **Analysis > Margin Anchor** (section 10.3) for more information.

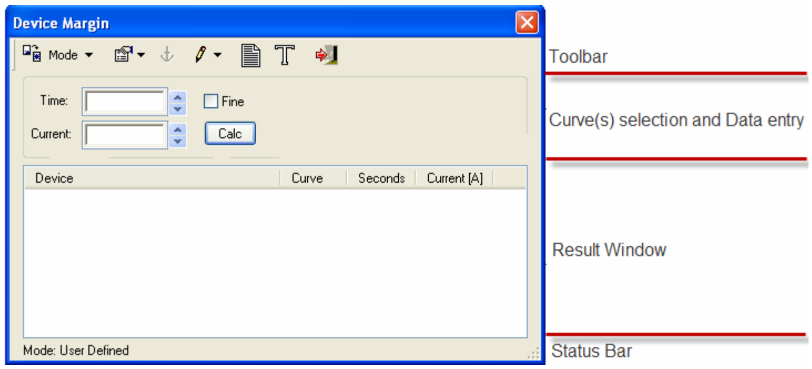
10.1.7 Device Coordination Options



Phase	Check to verify the phase element in your current study.
Ground	Check to verify the ground element in your current study.
Check Fast Curves	This option is used for when you have a downstream fuse and upstream reclosers.
Fuse Clearing	CYMTCC will make sure that the fuse curve will operate before the reclosers.
Fuse Saving	CYMTCC will make sure that the reclosers fast curve will operate before the fuse does.

10.2 Device Margin

This option detects the curve intersections and measures time and current margins between the curves. A dialog box is displayed with, at the top, a toolbar that allow you to perform several operations.



Toolbar

A drop-down list appears when you click on the button, from which you must select one of the nine modes.

- Mouse (See 10.2.1.1)
- Intersection (See 10.2.1.2)
- Sequence of Operation - Short-Circuit (See 10.2.1.3)
- User-Defined (See 10.2.1.4)
- Minimum Time Separation (See 10.2.1.5)
- Sequence of Operation - User Defined (See 10.2.1.6)
- Sequence of Operation - Range (See 10.2.1.7)
- Opening Times – Range (See 10.2.1.8)
- Opening Times - % Pickup (See 10.2.1.9)

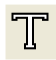
Display Options: A drop-down list appears when you click on the button. Each option is described below. (See 10.2.2)

Anchor: Creates a Margin Anchor between those two curves. (See 10.3)

Note: This button is enabled only when two curves are selected in the **Result** window.

Draw on plot: Creates a “special detail” line or circle. (See 5.13 Special Details).

Report: Creates a tabular report, docked at the bottom of the application, with the contents of the **Result** window. Like any other tabular reports, many operations can be done such as exporting it to Excel or printing it. (See 9.3 Summary (Tabular))



Device Description: Allows you to change the way each device type is displayed in the **Result** box. The option used to do this modification is the same as the tag customization (See 3.10.5 Tags Customization).

Exit. Closes the device margin dialog box.

<u>Curve(s) selection and Data entry</u>

This portion of the dialog box will change depending on the Mode you are using. The description for each of them can be found in the descriptions of each of the modes in this chapter.

<u>Result Window</u>

The **Device** Margin Result window will display the intersection points (Time/Current) for the curves crossing the time and/or current and/or curve(s) depending on the mode used and the data entered.

A description of the result is explained in each of the mode described below.

<u>Note</u>:	You can change the width of each column. The widths will be saved in the settings file by mode type. In other words, you can have different column widths for each Mode.

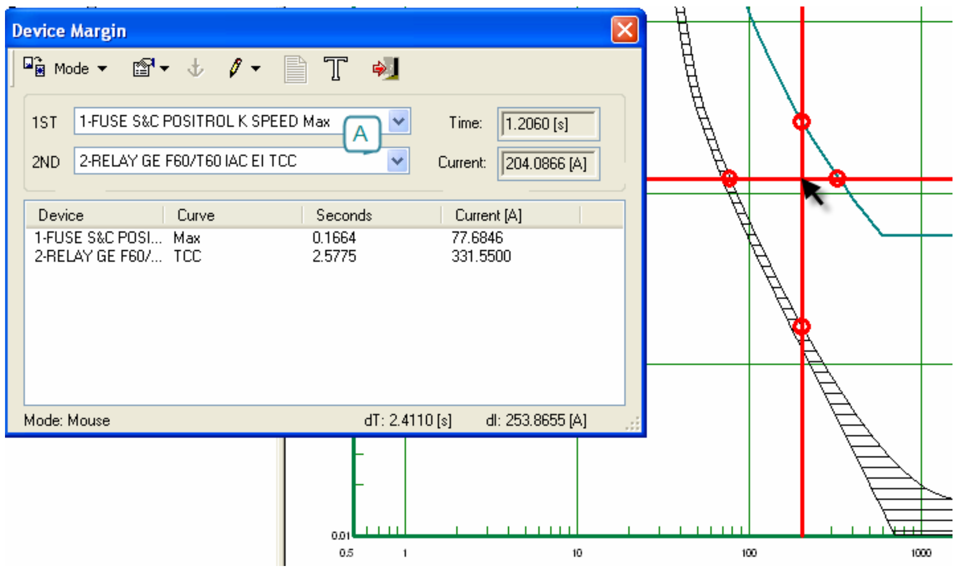
<u>Status Bar</u>

The status bar is divided in two parts:

- The right part displays the selected mode.
- The left portion displays the Margin between two curves. To see the margin, select the two curves by holding down the CTRL key on your keyboard. It will display the difference in time and/or in current between your selections.

10.2.1 Device Margin Modes

10.2.1.1 Mouse

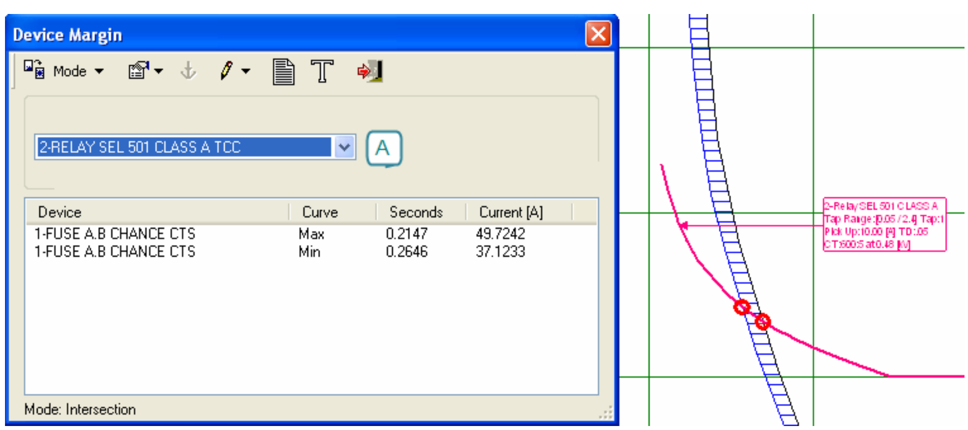


In the **Mouse** mode, the mouse position defines both the time and the current.

With the time and current value, the intersection points are calculated for the two selected devices A and displayed in the **Result** window with the time and current coordinates.

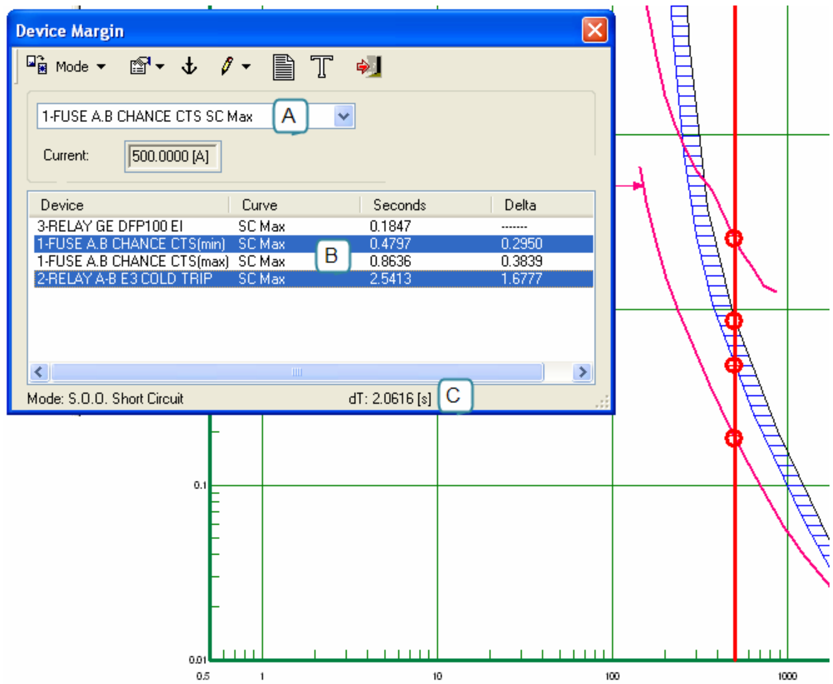
The Time separation is automatically displayed in the Status Bar.

10.2.1.2 Intersection



With the **Intersection** mode, CYMTCC finds the points where the selected curve A intersects with any other devices and displays the time and current coordinates.

10.2.1.3 Sequence of Operation - Short-Circuit



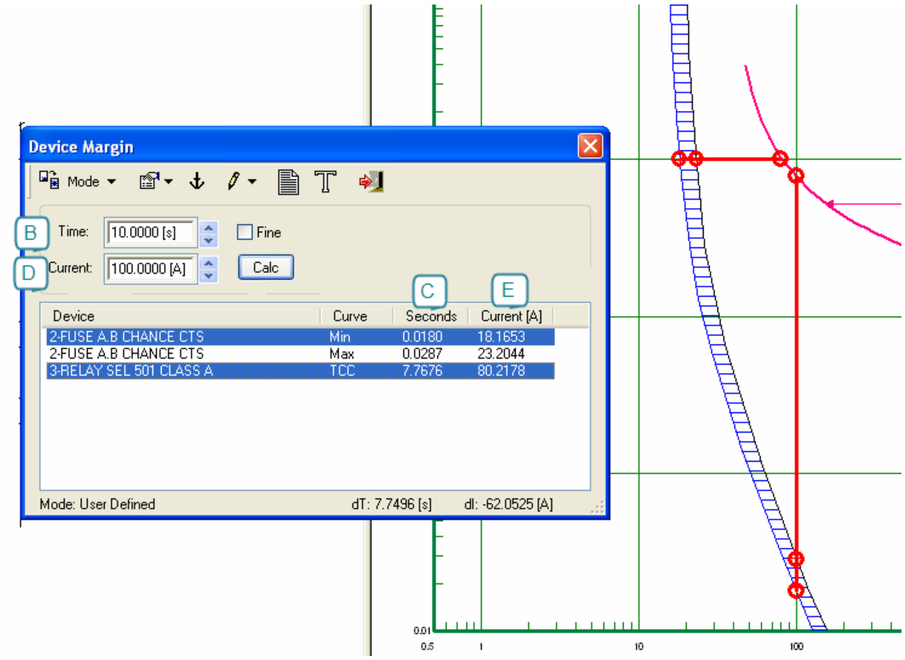
In the **Sequence of Operation Short-Circuit** mode, all the devices intersecting at the short-circuit value of the selected device A (note that only the device with a Short-Circuit are listed) will be displayed in the list with the time and current coordinates.

To get a device margin result, select any two devices from the list B. The result is displayed in the Status Bar below the device list. C

The **Time** column gives the opening time of each device part of your study at that current. The **Delta** column displays the margin between the consecutive devices.

The **Current** box below to the selected device A is the Short-Circuit of the selected device.

10.2.1.4 User-Defined



With the **User-defined** mode, you type in a time B and a current D, and then click on the **Calc** button.

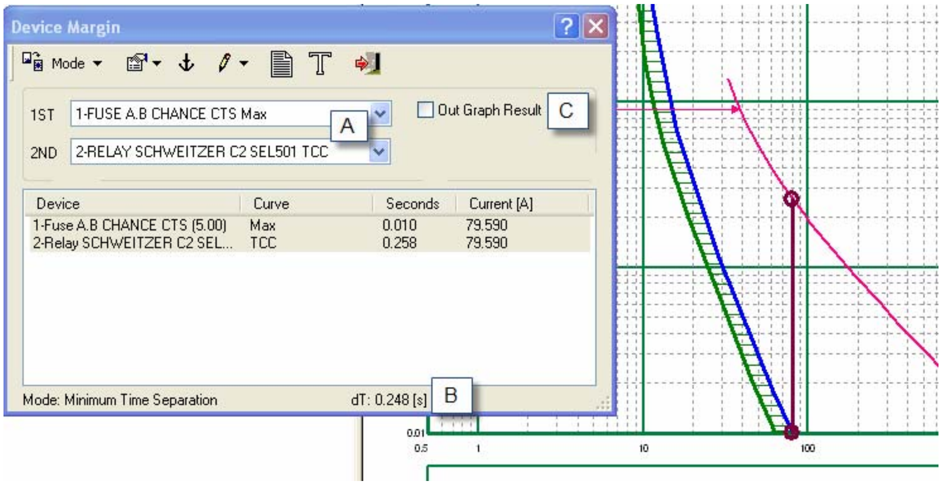
The intersecting points for the time and/or current will be displayed in the list with the time and current coordinates.

The intersection between the entered time and the curves are established with the time B and the current E. The intersection between the entered current and the curves are established with the current D and the time C.

To get a device margin result, select any two devices from the list. The result is displayed below the device list in the Status Bar.

Use the **up** and **down** arrow buttons, next to the time and current field, to change the current or the time by increments of 1/10 of a decade. Activate the **Fine** checkbox to adjust by 1/100 of a decade instead.

10.2.1.5 Minimum Time Separation



In the **minimum time separation mode**, the current where the time separation is the smaller will be displayed.

Simply select two different devices A to get the result.

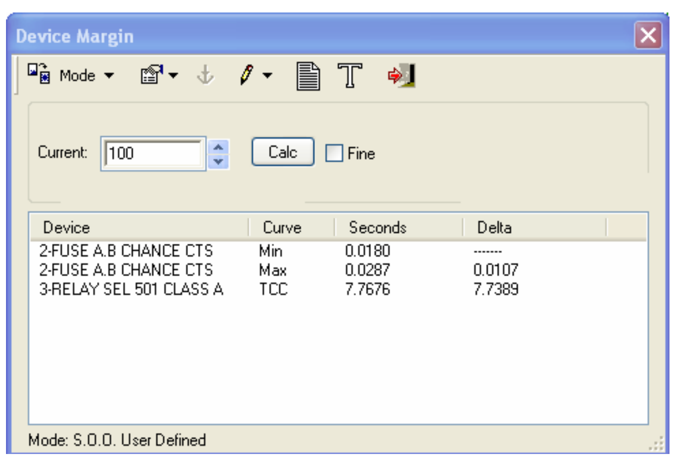
The intersecting points at the current where the time separation is the minimum will be displayed in the list with the time and current coordinates.

The Time separation is automatically displayed in the **Device Margin** result boxes in the Status Bar B.

C If you want the program to calculate the closest point between the two curves even if it is outside the plot (i.e.: greater than the maximum X value), check the box.

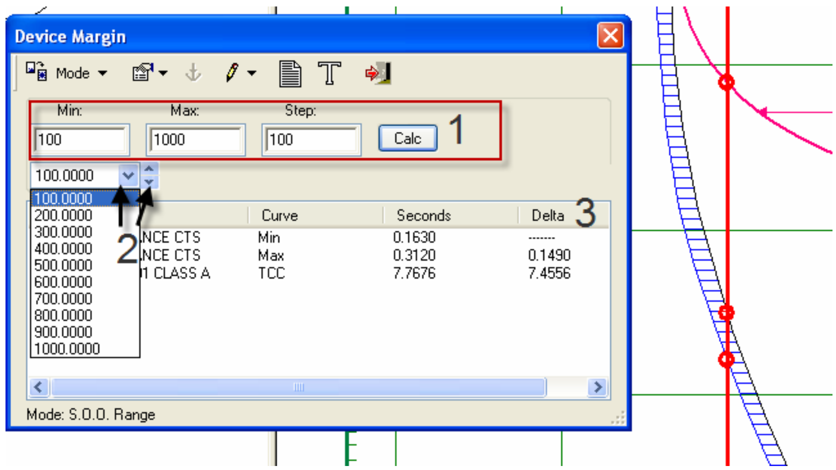
10.2.1.6 Sequence of Operation - User Defined

Same as the **S.O.O. Short Circuit** but you can specify the **Current** (in Amp) of your choice and the last column of the result window shows the delta value between each curve.



10.2.1.7 Sequence of Operation - Range

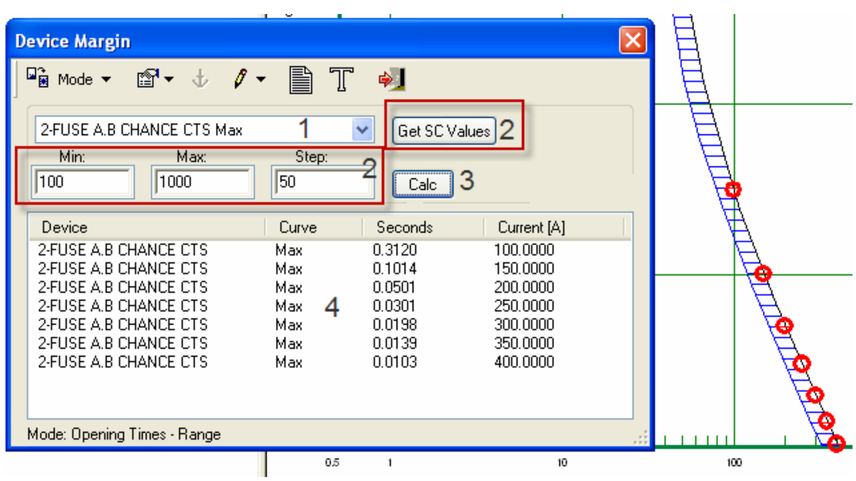
To get the device margin with this option you enter the minimum (**Min**), maximum (**Max**) and **Step** of the desired currents for which you want to verify the Sequence of Operation①. Click the **Calc** button when done. All the current points in between your Minimum and Maximum range appear in the drop down list. Select a specific current in it or use the Up/Down arrow to go to the next or previous point②. The **Delta Time** column displays the margin between each consecutive curve③.



10.2.1.8 Opening Times – Range

To get the opening times of a device for a specific range in amp., select the device from the device drop down list①. Then, enter the **Min**, **Max** and **Step** values or click the **Get SC Values** button. The Min and Max field will be filled with the Short-Circuit Min and Max②.

Click the **Calc** button to get the results③. The **Result** box will display all the opening times for all the values within the range④.



10.2.1.9 Opening Times - % Pickup

To get the opening times based on user-defined or a range of current points in % of Pickup of a specific device. This is similar to relay test points. Instead of the limitation of four points, you have the possibility of "n".

① Select the device from the device drop down list. The value next to the device name is the pickup of the selected device.

② Enter the **% of Pickup** in the field below the device name.

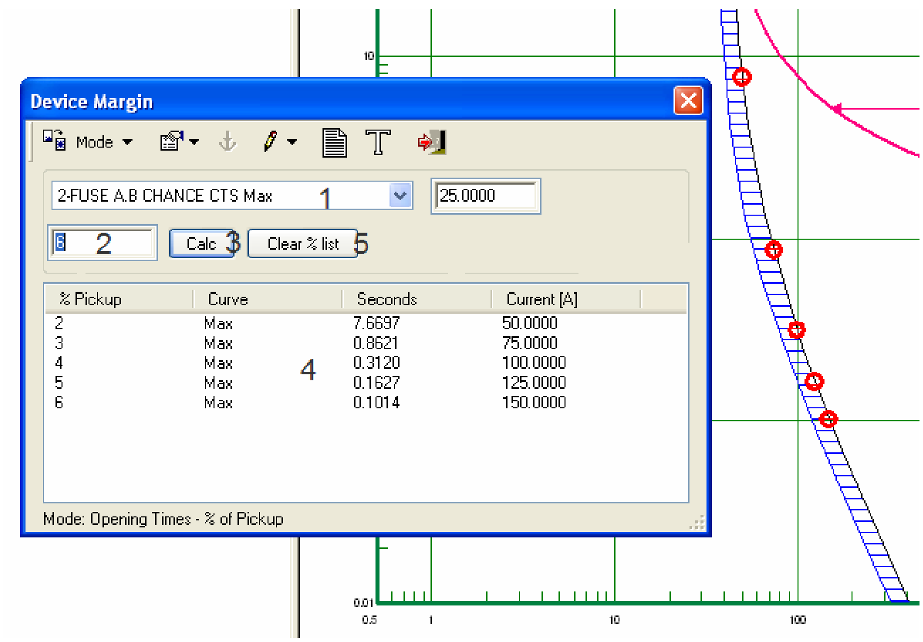
③ Click the **Calc** button or press the **Enter** key to get the results.

Note: If you press Enter, the value in the filed will automatically be selected allowing you to enter a new value right away.

④ The **Result** box will display all the opening times for each of the values you typed in.

⑤ To clear the list, click the **Clear % list** button.

There is no limitation on the number of pickups entered.



10.2.2 Display Options

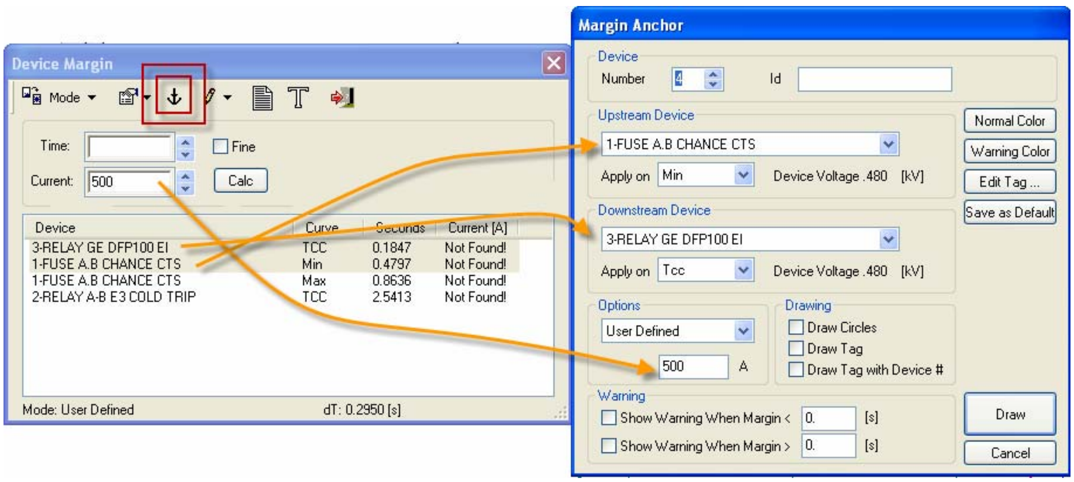
"not found" device	If checked, the curves that are not in the selected range will not be displayed. When not checked, the curve name will be displayed in the list with "not found" in the time/current column.
Draw circle(s)	When checked, will draw a circle at all the locations displayed in the list. When not checked, only the device that is selected in the list will have a circle.
Draw Horizontal Line	Draws an horizontal line at the selected time (second or cycles).
Draw Vertical Line	Draws a vertical line at the selected current (Amp).
Change On Curve Click 1st and 2nd	Instead of changing the curve selection using the combo box, you simply have to click on the curve directly on the plot. To facilitate to use of device margin, the **Display** group box contains options to change the first and/or the second curve selection just by clicking directly on the curve plot. If both options are checked, to change the 2nd curve, the **Shift** key needs to be pressed down when the curve is clicked. If only one of the two options is checked then, just click on the desired curve. You can always use the combo box to change your selection. For Fuse and LVCB curves, to change from the min/max curves, you need to click twice on the curve, i.e., the first time you click on a fuse curve, the min curve will be selected if you click a second time on it, the max curve will be selected.
Vertical / Horizontal Line	Creates a "special detail line" based on the device margin result. (make sure that you have a separation margin first) (see 5.13 Special Details)
Color	Gives you the possibility to change the line and circle color, line type or line width.
Do not show hidden device	When this checkbox is enabled, the devices for which the curves are hidden  will not be listed in the **Results** window.
Cycles	When this checkbox is *enabled*, the results are displayed in *cycles*, when it is *disabled*, the results are displayed in *seconds.*
Precision	You can select the number of decimals you want to see for the Cycles (Seconds) and for the Current(A) results shown in the dialog box.

Note: The options are enabled or disabled depending on the mode of operation selected.

10.2.3 Margin Anchor

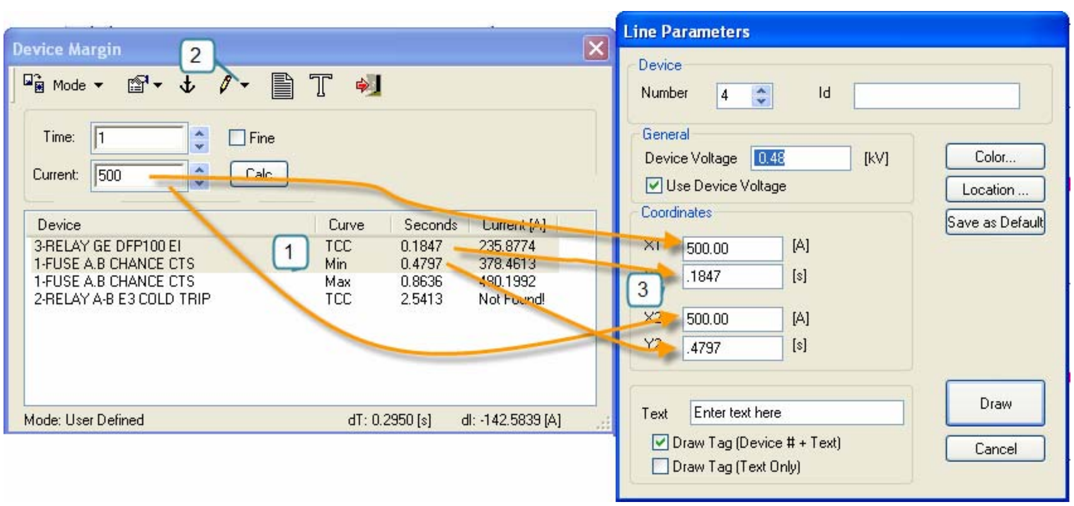
Directly from the device margin, you can create a "margin anchor" line by selecting two devices from the **Result** window and clicking on margin anchor icon on the toolbar. 

The **Margin Anchor** dialog box will open with some of the data already selected, such as the upstream and downstream device and the current value. If you would like to adjust any other parameters, do so and click **Draw** when you are done. For more information on the Margin Anchor see chapter 10.3.



10.2.4 Draw Horizontal or Vertical Line between the Selected Devices

Directly from the device margin, you can create a "special detail" line by clicking on the Vertical Line or Horizontal Line button. (Below, "vertical" was clicked)



1. Select two devices from the list.
2. Click on Vertical Line or Horizontal Line
3. As you can see, the values were transferred to the dialog box automatically. Click **Draw** to display the line in your plot.

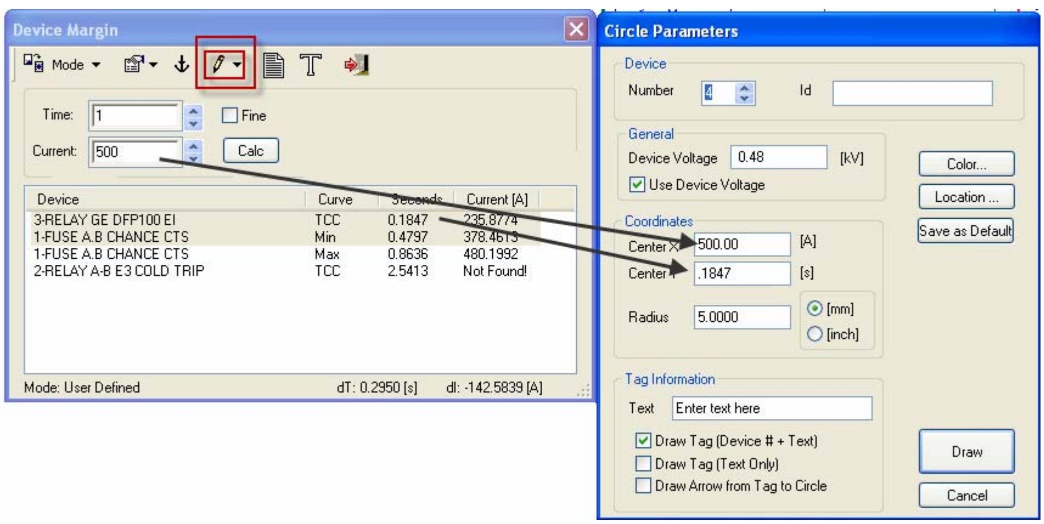
The buttons will be enabled or disabled depending on the “tracking mode” selection and when two devices from the list are selected.

Important:	The line is static; meaning that it will remain at the same position unless you modify the values. It will not follow the selected curves. Use the Margin Anchor (Chapter 10.3) option to have a line that will follow the curves when they are moved.

10.2.5 Draw Circle

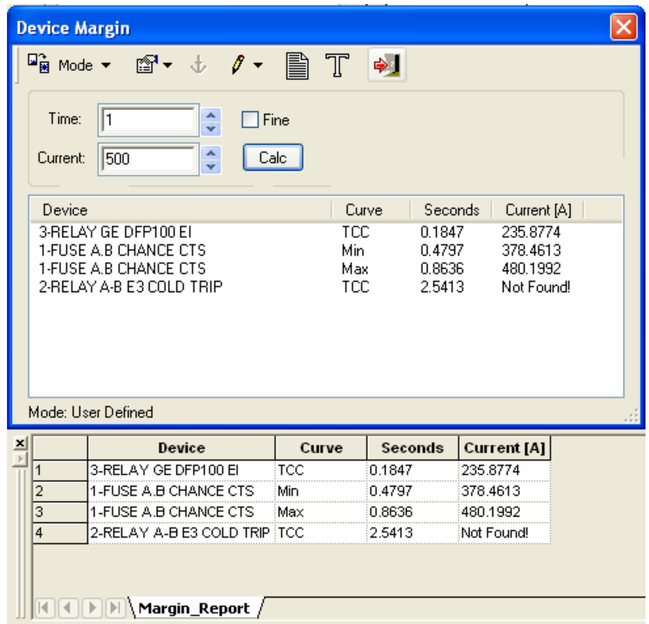
Directly from the **Device Margin** dialog box, you can create a “special detail” circle by clicking on the **Circle** button. The **Circle Parameters** Dialog will automatically open with the X,Y values taken from the **Device Margin** result box.

It is possible to select multiple points by holding down the CTRL or SHIFT button while making the selections. If you do so, the **Circle** parameters dialog box will be opened as many times as you have lines selected.



Important:	The circle is static; meaning that it will remain at the same position unless you modify the values. It will not follow the selected curves. Use the Margin Anchor (Chapter 10.3) option to have a circle that will follow the curves when they are moved.

10.2.6 Margin Report



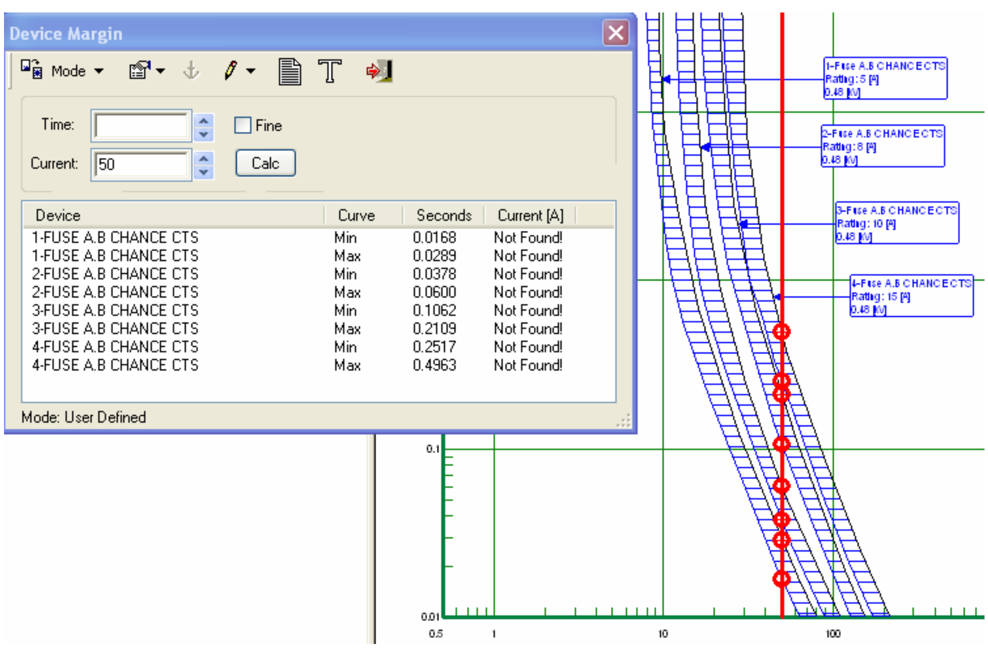
When the **Report** toolbar icon is clicked, the **Result** window currently visible will be exported to a tabular report docked at the bottom of the CYMTCC application.

See the **Summary (Tabular)** report (section 9.3) to get a description of all the operations you can accomplish with this report.

10.2.7 Device Description

By clicking the **Device Description** button, you can change the way that the device name (**Device** column in the **Result** window) will be displayed.

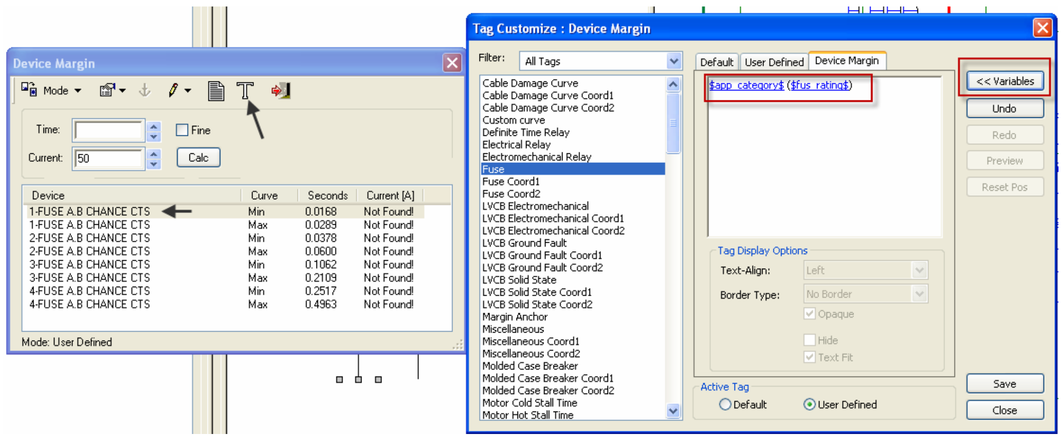
For example, if you are in a situation where you have more than one fuse of the same type but with a different rating in the same study. By default, the device margin result box will only display the device number and the device type.



When you click on the **Device description** icon, the **Tag customization** dialog box will open. Notice that the tab selected in the dialog box is **Device Margin**. You can now add variables as you would have done in the **Tags Customization** option (see section 3.10.5).

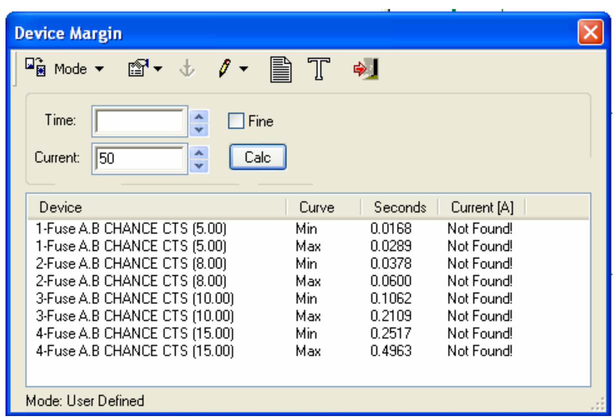
To get access to all the variables, click the **Variables** button. For your information, the $app_category$ variable is the one used by default. In the example below, we have added the $app_category$ variable and added the Fuse Rating variable between parentheses (fus_rating_name). Click **Save** and then **Close** when you are done.

Note:	Only the first line will be used.

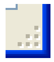


Now, as you can see below, the rating is now included the device name description.

Note:	You might have to click in the plot window to refresh the **Device Margin** result box.



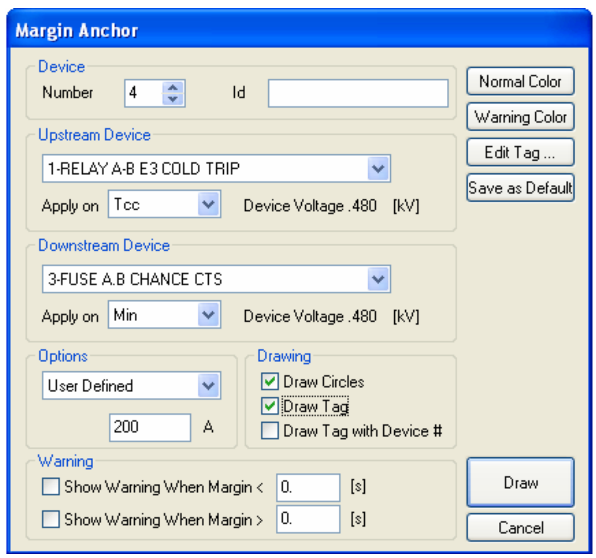
10.2.8 Other Useful Tips

The window is resizable. Use the lower right corner to resize. Next time you open the **Device Margin** dialog box, the dialog box will be the same size.

You can change the settings of any of your device and keep the **Device Margin** dialog box open and the **Result** window will refresh itself automatically to reflect the changes. You can use the **Fast Adjust** (section 12.1) to move your curves.

10.3 Margin Anchor

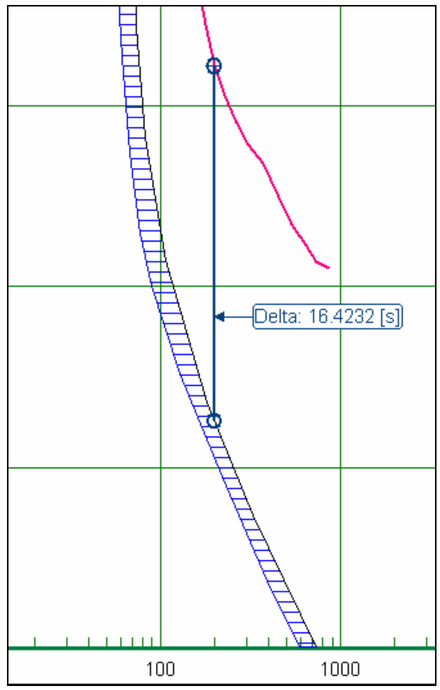
This option allows you to add a line between two curves at X current, so you can verify the margin in time between them even if they are shifted.



1. Select the **Upstream and Downstream device** from the drop down list**.**
2. Select the curve to **apply** the anchor on.
3. Select the **Option** you would like to use to define the current level at which the line will be drawn.
   - **User Defined**: Manually enter a value in Ampere.
   - **Short-Circuit** (Downstream/Upstream for the SC min or max): If the device has a Short-circuit value, it will be use.
   - **Minimum Time Separation**: The current will be where the curves are the closes to each other.
4. In the **Drawing** group box, you can choose to add **circles** (on both tips of the anchor line) and draw a **tag** showing the delta in seconds between the two curves. The **draw tag with device #** shows the device# at the beginning of the tag. You can customize the tag by using the **Edit Tag** button.

5. In the **Warning** group box, you can choose to display the line in a different color when the delta value is smaller or greater than the value entered. Use the **Normal Color** and **Warning Color** buttons to select the colors.

6. The **Set as Default** button will remember the Options, Drawing and warnings selection for the next time you use this option.



Note:	To open an existing margin anchor, double click on the line or select the margin anchor from the device list and choose **Device Properties** from the **Edit** menu.

Note:	Under the **Options** menu you will find an option to hide or unhide all the margin anchors.

10.4 Coordination Criteria

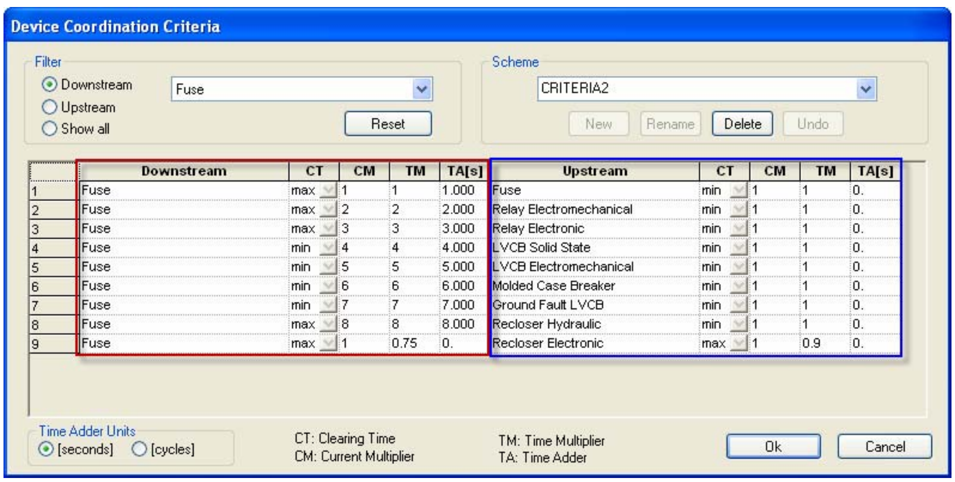
This option allows you to define the desired clearances between successive pairs of devices (that is, between a device and its upstream neighbor in the One Line Diagram.)

CYMTCC uses these criteria only when you ask it to evaluate device coordination in a study. Refer to the **Analysis > Protective Device Analysis** command (Section 10.1).

Note: The order of devices is important. You may define different criteria for a fuse downstream of a relay and for a relay downstream of a fuse.

10.4.1 Device Coordination Criteria – Window Elements

This dialog box allows you to define desired clearances between successive pairs of devices. You can enter separation criteria for each possible pair of device types (e.g. fuse-fuse, hydraulic reclosers-fuse).



The leftmost columns refer to the downstream device while the rightmost columns refer to the upstream device of a pair.

To help you find your device pair faster, set the filter to Downstream or Upstream and select a device type from the combo box. The list will be limited to the selection you've made.

The adjustment of each of the four columns is described below.

- Clearing Time (CT) page 182
- Current Multiplier (CM) page 183
- Time Multiplier (TM) page 183
- Time Adder (TA) page 184

To set the criteria, enter separation criteria for each possible pair of devices. Select the clearing time curve (min/max) and enter one or more separation parameters (Current Multiplier, Time Multiplier or Time Adder). Click **OK** when finished.

The **Filter** options are used to view the criteria for only a specific device.

The **Reset** Button will change all the visible fields to CT=1, CM=1, TA = 0, Downstream CT to Min, and upstream CT to Max.

The **Scheme** option is used to create different coordination criteria file settings and to change the selected scheme. To create a new Scheme, type a new name in the combo box and click **New**. The new criteria **Scheme** will have the same data as the one that was active. If the name you entered is the same than an existing criteria file, the existing file will be loaded, not overwritten. To rename, change the name in the combo box and click **Rename**. Click **Delete** to remove a Scheme.

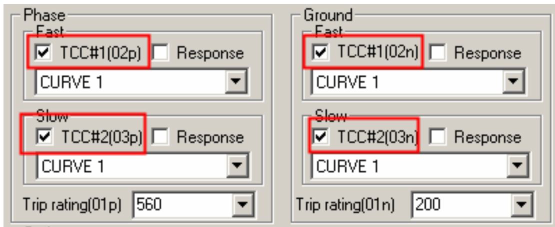
10.4.1.1 Clearing Time (CT)

This column allows selecting which curve (minimum or maximum) will be used for comparing each device of the pair with respect to its device type. The minimum and maximum curve may refer to a different curve according to the device type selected, as follows:

Device	Min Curve	Max Curve
Fuse	Minimum melting Curve	Total clearing curve
Relay Electromechanical	Total clearing curve[1]	Auxiliary device[2]
Relay Electronic	Total clearing curve[1]	Auxiliary device[2]
Recloser Hydraulic	Response curve[3]	Total clearing curve[1]
Recloser Electronic	Response curve[3]	Total clearing curve[1]

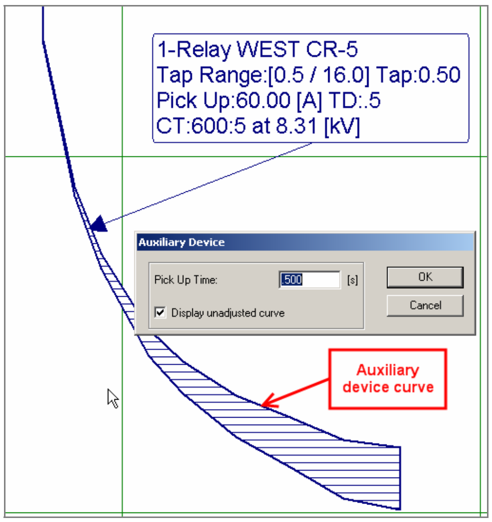
Total Clearing Curve (note 1)

Represents total clearing time of the **Phase** or **Ground** trip unit, including the interrupting time. Set in the Device Settings dialog box.



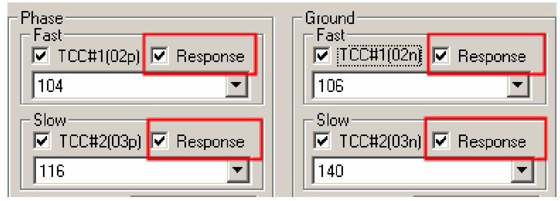
Auxiliary Device (note 2)

Represents an additional delay introduced by some other device (lock-out relay, circuit breaker, etc.). The relay curve is shifted upwards by this delay.



Response Curve (note 3)

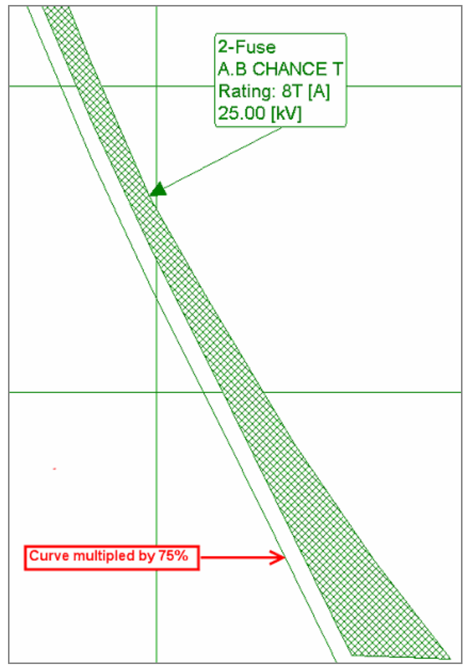
Represents the reaction time of the control unit only (of the reclosers).



10.4.1.2 Current Multiplier (CM)

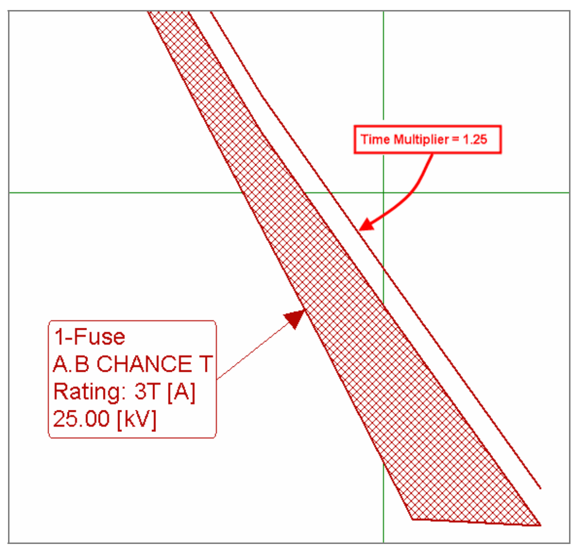
The current multiplier shifts the curve horizontally (current axis) in order to simulate a smaller or greater pick up value. The multiplier creates a "virtual" coordination curve.

On the example shown, a current multiplier of 75% (0.75) was applied on the second fuse curve. Consequently, each point of the upstream curve was shifted to the left. Note that a multiplier greater that 100% (1.0) would have shifted the curve to the right.



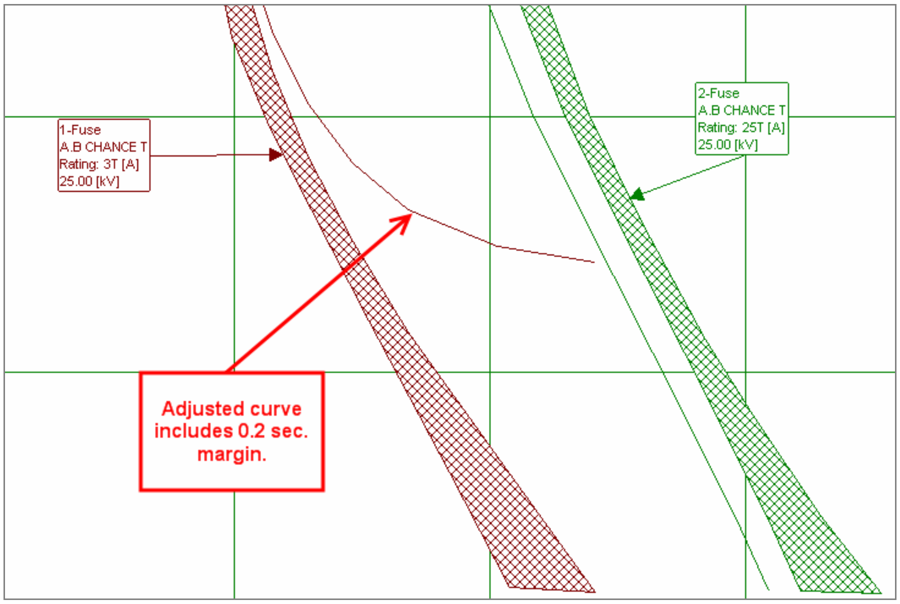
10.4.1.3 Time Multiplier (TM)

Shifts the curve vertically (time axis) in order to make the curve operate slower or faster. On the example shown, the total clearing curve of the downstream curve is made 25% slower that the real curve.



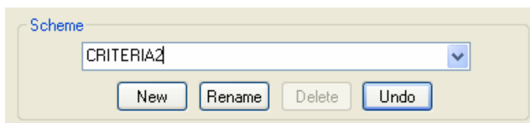
10.4.1.4 Time Adder (TA)

Adjusts the curve using a margin in seconds (or cycles). In the example below the clearing curve of the downstream fuse now takes into account a desired 200 millisecond time margin, to make sure that any downstream fuse always completely clears 0.20 second before any immediately upstream fuse begins to melt.



By default, the criteria you enter are stored in an initialization file (namely CRITERIA.INI) located in your Windows folder.

You can use the **Scheme** option to create different coordination criteria file settings and to change the selected scheme.



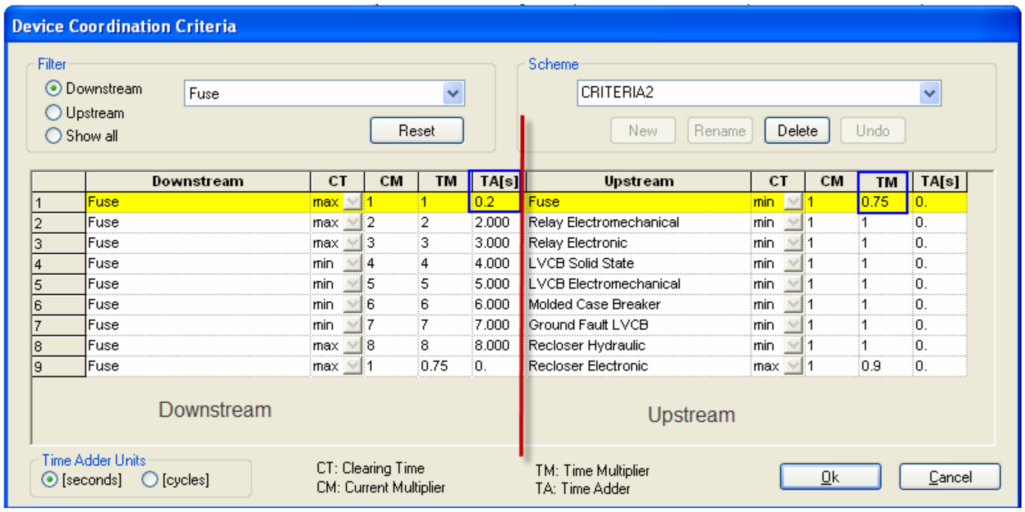
To create a new coordination scheme, type a new name in the combo box and click **New**. The newly created scheme will have the same data as the one that was active.

To rename the scheme change the name in the combo box and click **Rename**.

Click **Delete** to remove an existing scheme.

There is no link between the criteria file and any specific study. The coordination schemes set through the **Device Coordination Criteria** dialog box are global and will be applied to all your CYMTCC studies.

10.4.2 Device Coordination Criteria - Example



Example showing fuse-to-fuse coordination criteria

In the example shown above, on the first line, the melting curve of the **upstream** fuse is made 25% more rapid, to reflect the fuse “fatigue”. The clearing curve now of the **downstream** fuse takes into account a desired 200 millisecond time margin, to make sure that any downstream fuse always completely clears 0.20 second before any immediately upstream fuse begins to melt.

These particular criteria are used to draw the resulting curves (illustrated below). Use the **Analysis** > **Show Coordination Curves Based on Criteria** menu option (section 10.7) to enable this.

If you use **Analysis > Protective Device Analysis** (Section 10.1), CYMTCC will check for intersection of the “coordination” curves within the available range of short circuit currents (defined using the **SC & FLA** button, Section 5.3.3 Device Voltage. Such an intersection is circled in the picture below. It does not mean that the two fuses do not coordinate; it simply means they do not maintain the 0.2 second margin at all fault currents.

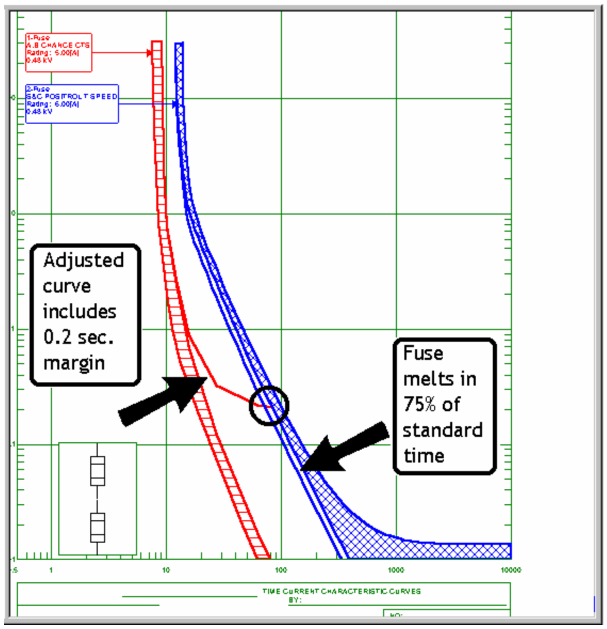


Illustration of Coordination Criteria example

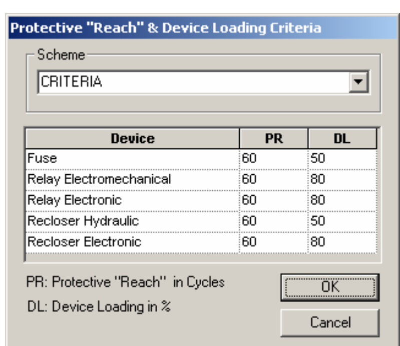
10.5 Reach and Load Criteria

This option allows you to define the maximum permitted operating time ("Reach") for each type of device as well as the maximum permitted continuous load current. The latter value is expressed as a percentage of the device's pick-up current.

Hint: Whether or not a device responds quickly enough to small fault levels determines how much of the downstream circuit is in its protective "reach", since there may be some location downstream where a fault would cause so little current to flow through the device that it would not react.

If you activate the **Analysis > Protective Device Analysis** menu command, CYMTCC will report all devices which do not respect one or both of these criteria.

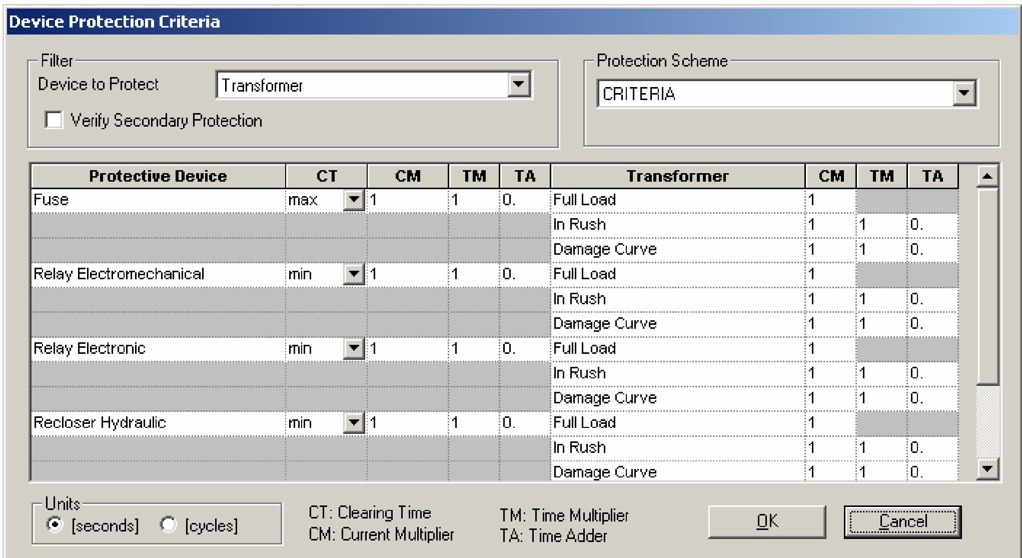
Note that the minimum and maximum fault currents, as well as the load current may be defined for a device through the **SC & FLA** button in the **Device** dialog box (See Section 5.3.3 Device Voltage). If the fault currents are specified, the "Reach" criteria will be applied within that range of currents only.



Click on the cell spaces next to the device name. In the **PR** (Protective Reach) column type is the maximum desired opening time in cycles. In the next column, **DV** (Device Loading), enter the desired maximum loading in percent of the device’s pick-up current.

10.6 Protection Criteria

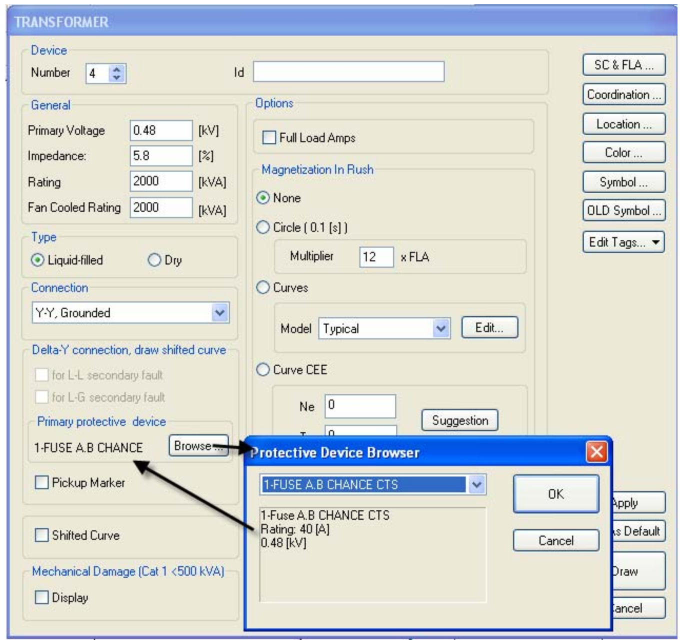
This option allows you to define the desired clearances between the device to protect (Transformer or cable damage curve) and the Protective Device.



To open the **Device Protection Criteria** dialog box, go to the **Analysis** menu and select **Protection Criteria** or click on the corresponding icon of the Analysis Toolbar.

For the transformer protection, enter the separation criteria for the device that is protecting the transformer for the different “curves” of the transformer. Select the clearing time curve (min/max) and enter one or more separation parameters (Current Multiplier, Time Multiplier or Time Adder). CYMTCC will also makes sure that device curve **passes** the transformer full load, the inrush (point or curve) and **clears** transformer damage curve.

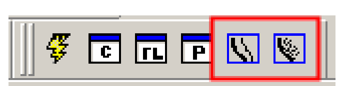
In the transformer dialog box, select the device protecting the transformer.



10.7 Show Coordination Curves Based on Criteria

Coordination curves will be drawn based on the criteria entered in the coordination input box. If you already have coordination curves set directly in a device, these curves won't be displayed. This is a quick and easy way to verify if you have any coordination problems.

To activate this option, go to the menu option **Analysis > Show Coordination Curves Based on Criteria** and select **Display Curves** or/and **Display Hatching** or, click on the corresponding icon(s) in the Analysis Toolbar.



The curves and the hatching that will be displayed are based on the criteria entered using the Coordination Criteria (see 10.4) menu option.

Note: If you have a coordination curve on a device and you enable that command, it will disable the coordination you have set in the device to show the one that is based on the coordination criteria set.

10.8 Do Not Show Hidden Devices in Report

Select this option if you do not want the devices that are currently hidden to be listed in the reports.

See 4.11 Hidden and 4.12 Multi-Hide Selection for more information.

Chapter 11 The Arc Flash Analysis Menu

The Arc Flash Hazard Analysis module is primarily designed to analyze and promote the electrical safety for employees working on or near electrical equipment. It computes the necessary parameters required to assess the risk level and adopt the adequate safety procedures, thus minimizing the risks of burns and injuries.

The Arc Flash module complies with industry recognized standards and methods for performing the calculation of arc flash hazards for different types of equipment in various power systems. This includes the Electrical Safety Requirements for Employee Workplaces (NFPA-70E) and the Institute of Electrical and Electronic Engineers (IEEE-1584) for the industrial-type analyses. To account for the differences in distribution networks, CYME has introduced two new algorithms in the module. The first one is based on NESC-2007 tables and the other one, called Heat Transfer Model, is based on the Heat Flux calculations[1]. These new methods are based on line-ground fault which represent about 80% of the faults occurring on a distribution system.

11.1 Distribution Analysis

The main objective of the analysis of arc flash hazards in distribution systems is to identify the **Cal System**. The value calculated represents the personnel protective equipment to use by the workers. A secondary objective is to determine the minimum approach distance and the flash hazard boundary. For this end, the module uses two methods: the NESC 2007 and the Heat Transfer Model. These two methods are based on Line-Ground faults only.

11.1.1 NESC 2007

In NESC 2007 analysis, the Cal system is determined by analyzing the phase-to-phase voltage, the fault current and the opening time of the protective device for a fault for a device. These parameters are compared with NESC 2007 tables – Clothing and clothing systems. The standard does calculate the Incident Energy; it will be indicated as “N/A” in the results. Since the Flash Hazard boundary directly derives from the Incident Energy, it will also be shown as “N/A” in the results.

11.1.2 Heat Transfer Model

In the Heat Transfer Model analysis, the Cal System is determined by calculating the Incident Energy based on a physical model of the arc blast. Based on the NESC 2007, the Cal System will be set to 2, 4, 8, 12 or > 12. The Cal System will always be equal to the upper boundary in function of the Incident Energy calculated.

This method is based on the Heat Flux algorithm. With this method, CYMTCC calculates the amount of incident energy released from a line-to-ground fault. This incident energy is based on the following parameters:

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[1] This complex model was published in Electrical Safety Handbook, By John Cadick, Mary Capelli-Schellpfeffer, Dennis K. Neitzel, Published by McGraw-Hill Professional, 2001, Chapter 3.52.

I_{SC}	: Fault current	[A]
L_{arc}	: Arc Length	[in]
a	: Distance of victim form the arc	[in]
t_p	: Arc Duration	[s]

11.1.3 IEEE 1584-2002 Lee Method

Theoretically-derived Lee method is included in the IEEE-1584-2002 standard. Note that it can be applied for voltages over 15kV. At this voltage, the arc fault current is considered to be equal to the bolted fault current. With this method the bolted fault current will be considered as a 3-phase fault.

$$E = 2.142 \times 10^6 V I_{bf} \left(\frac{t}{D^2} \right)$$

Where

E	: Incident Energy	[J/cm^2]
V	: System Voltage	[kV]
t	: Arcing Time	[s]
D	: Distance from the arc Point to Person	[mm]
I_{bf}	: Bolted Fault Current	[A]

11.1.4 Reports

Distribution > NESC

ArcFlash NESC 2007

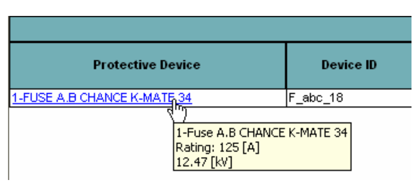
Protective Device	Device ID	Device Voltage [kV]	Bolted Fault [A]	Bolted Fault Override [A]	Clearing Time[cyc]	Minimum Approach Distance [in]	Cal System	Standard / Method	Show Graph
1-FUSE A.B CHANCE K-MATE 34	F_abc_18	12.47	6000	0	0.600	26	4.0	NESC	...

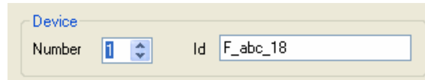
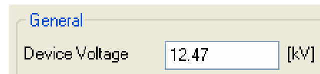
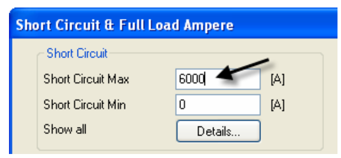
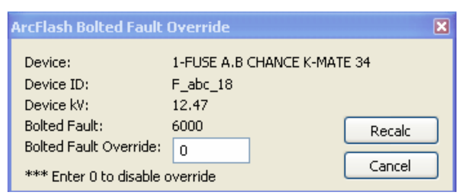
Distribution > Heat Transfer and Lee Method

ArcFlash Heat Transfert

Protective Device	Device ID	Device Voltage [kV]	Bolted Fault [A]	Bolted Fault Override [A]	Clearing Time[cyc]	Minimum Approach Distance [in]	Flash Hazard Boundary [in]	Incident Energy [cal/cm2]	Cal System	Standard / Method
1-FUSE A.B CHANCE K-MATE 34	F_abc_18	12.47	5000	0	0.660	26	0.000	0.054	2.0	Heat Transfert

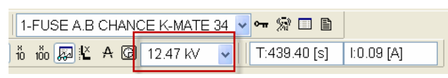
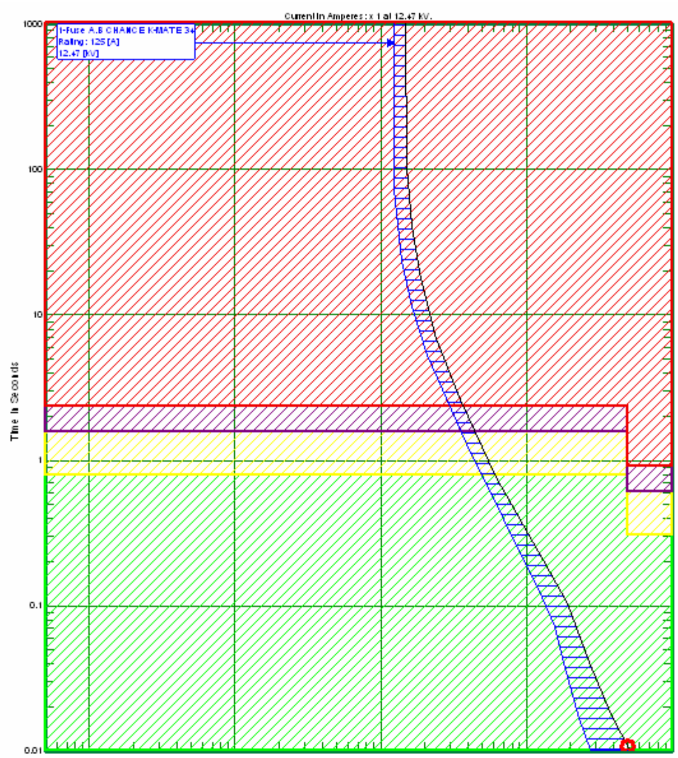
11.1.4.1 Fields Description

Protective Device	Shows the name of the protective device that will interrupt the fault. **Note**: Click on its name to open the **Device Properties** dialog box. **Note**: On mouse over, a tooltip showing the settings of the device is displayed. 

<table>
<tr><td>Device ID</td><td>The device ID of the protective device detecting the fault. This field can be left blank: it is used for information only.

</td></tr>
<tr><td>Device Voltage</td><td>The Device Voltage of the protective device detecting the fault.

</td></tr>
<tr><td>Bolted Fault</td><td>The Max Short-Circuit of the device detecting the fault. (See Create > Common > Short Circuit & Full Load Amperes, section 5.3.6)

</td></tr>
<tr><td>Bolted Fault Override</td><td>If the Bolted fault is not the same than the Bolted fault entered directly in the device detecting the fault, click on the value in the column. A dialog box will allow you to override the value. Click recalc to close the dialog box. The Arc flash calculation will now use this new value. To go back and use the “Normal” bolted fault, click on the override value and enter 0 (zero) as the override value.

</td></tr>
<tr><td>Clearing Time</td><td>The time it will take for the protective device to interrupt the current at the bolted fault or override bolted fault value.

<u>Note</u>: You can click on the opening time value to display a circle on the Time/Current plot curve at the Bolted fault current and opening time.

<u>Note</u>: The Time format can be changed in the parameters option. (See Set Time Format in chapter 11.3.1.2)</td></tr>
<tr><td>Minimum Approach Distance</td><td>(more details to come)</td></tr>
</table>

Arc Flash Boundary	(For the heat transfer method only) (more details to come)
Incident Energy	(For the heat transfer method only) (more details to come)
Cal System	The Cal System result based on your settings/values. **Note**: The cell background color changes depending on the result. It is set to the color defined in the parameters. It can be changed using the **Parameters** option. (See Set Color for NESC cal system in chapter 11.3.1.5)
Standard / Method	Shows the name of the type of analysis that the current report is displaying.
Show Graphic	Click on the  button to see a graphical view of all the Cal System in the Time/Current plot. The graphic is based on the plotting voltage value currently selected.   The colors can be changed using the **Parameters** option. (See Set Color for NESC cal system in chapter 11.3.1.5)

11.1.4.2 Error Codes in Reports

Unable to find an opening time. The Bolted Fault is probably smaller than the pickup of the protective device.

ArcFlash Heat Transfert										
Protective Device	Device ID	Device Voltage [kV]	Bolted Fault [A]	Bolted Fault Override [A]	Clearing Time[sec]	Minimum Approach Distance [in]	Flash Hazard Boundary [in]	Incident Energy [cal/cm2]	Cal System	Standard / Method
1-FUSE A.B CHANCE K-MATE 34	F_abc_18	12.47	5000	10	0.000	0	0.000	0.000	0.0	n/a

The device voltage too high or not covered. The **Device Voltage** value is displayed in red. The maximum voltage is 800 kV. Also, some values are not covered by the standard. See the NESC table by clicking the **View details** button in the Set Color for NESC cal system (see chapter 11.3.1.5).

ArcFlash Heat Transfert										
Protective Device	Device ID	Device Voltage [kV]	Bolted Fault [A]	Bolted Fault Override [A]	Clearing Time[sec]	Minimum Approach Distance [in]	Flash Hazard Boundary [in]	Incident Energy [cal/cm2]	Cal System	Standard / Method
1-FUSE A.B CHANCE K-MATE 34	F_abc_18	555	6000	0	0.000	0	0.000	0.000	0.0	n/a

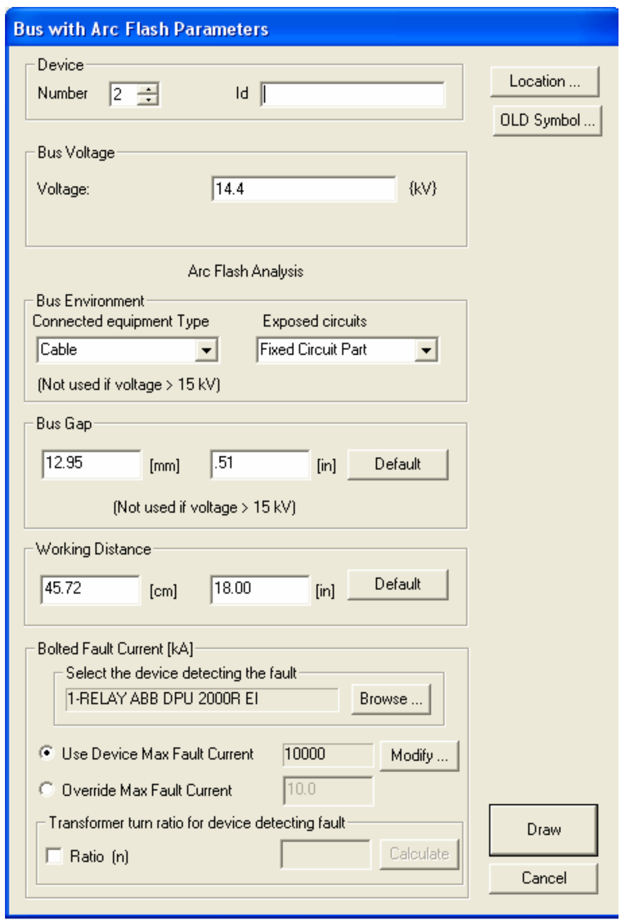
11.2 Industrial Analysis

11.2.1 Standards

The standard methods utilized when computing the potential arc flash characteristics of equipment in an industrial system are either **IEEE-1584** or **NFPA-70E**. There are two exceptions where this choice is overridden. In the advent that the equipment is in open air, NFPA-70E falls back to the **Lee method** instead. Second, in the event that the equipment base voltage is higher than 15,000 volts, IEEE-1584 falls back to **Lee method** also.

11.2.2 Data entry

All buses have “Arc Flashes” parameters. Four different types of information are related to arc flash hazards and must be specified.



Bus Environment	**Connected Equipment Type:** The possible values are: Open air, Switchgear, MCC or panel, Cable. **Exposed Circuit:** The possible values are: Movable or Fixed.

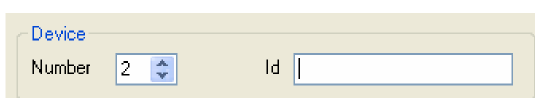
Bus Gap	The default value for this parameter depends on the voltage and on the type of device connected. The IEEE standard provides typical values for this field. The user can manually enter the value in the field. The value can be expressed in millimeters or in inches.
Working Distance	The default value calculated here depends on the voltage and on the type of device connected. The IEEE standard provides typical values for this field. The user can override the default by manually entering the value in the field. This value can be expressed in millimeters or in inches.
Bolted Fault Current	1. Select the device that will detect the fault by clicking the **Browse** button. A list showing all the protective devices of the active study will be displayed. Make your selection and click **OK**. 2. Specify the **max bolted fault current** at the device. You can either use the **Maximum short-circuit available** directly within the device or override the default value and manually enter a value. 3. If the device detecting the fault is on the other side of a transformer, check the **nRatio** box and type in the ratio between your bus and the device detecting the fault. If the values were entered correctly in the device and in the **Bus Device** dialog boxes, simply click the **Calculate** button to get the result. 4. If the device has a path to ground, make sure that the box is checked.

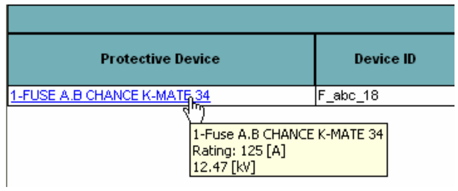
Note: Conversion between inches and millimeters is done automatically when jumping from one field to another.

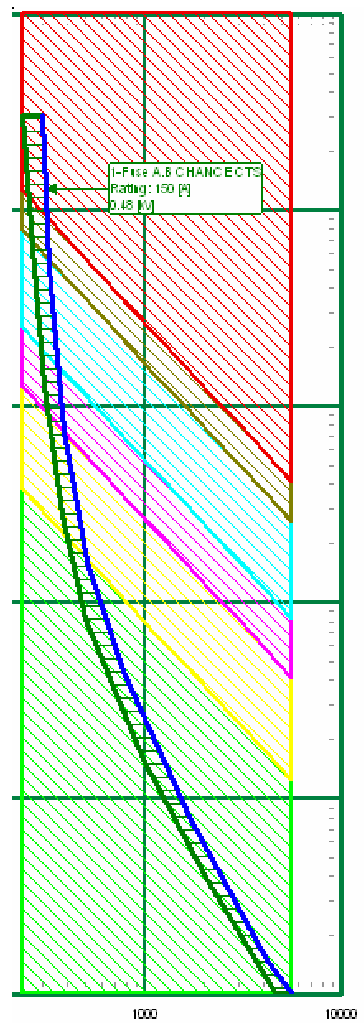
11.2.3 Reports

ArcFlash IEEE-1584									
	Bus Id	Device detecting fault	Arcing Fault Mult	Arcing Fault [A]	Max Opening Time[sec]	Risk Category	Standard / Method	Full Analysis	Energy Curve
☐	2-Bus	1-FUSE A.B CHANCE CTS	100%	84.286	0.010	0	IEEE	Run	Show

Fields Description

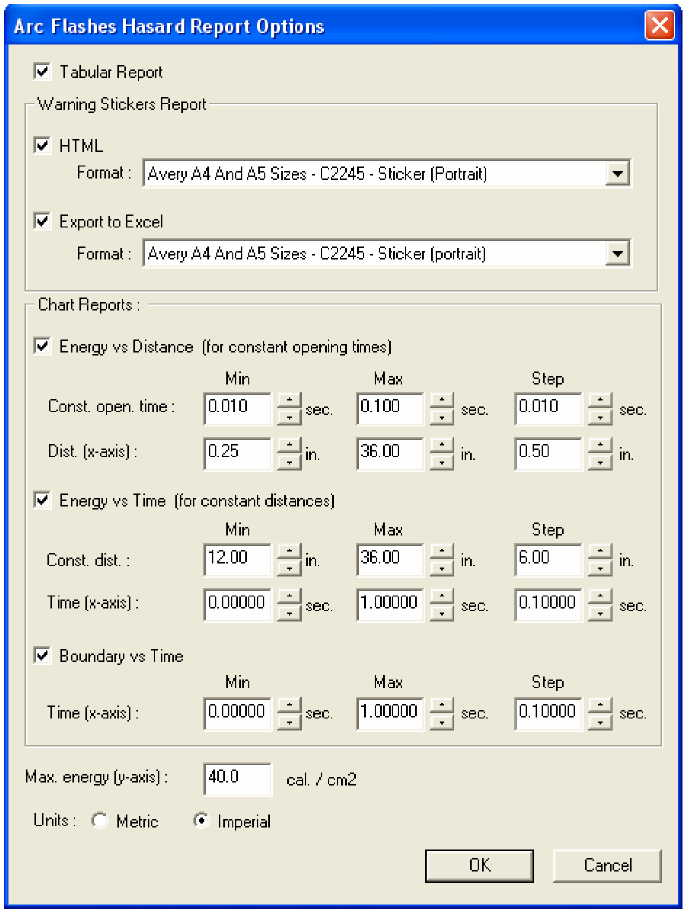
Checkbox	All the checked items will be included when the full analysis is run.
Bus Id	The ID of the bus that include the arc flash settings. If the field is blank, the device number followed by "-bus" will be displayed. 

Device Detecting Fault	Shows the name of the protective device that will interrupt the fault. **Note**: Click on its name to open the **Device Properties** dialog box. **Note**: On mouse over, a tooltip showing the settings of the device is displayed. 
Arc Fault Mult	This value can be 100% or 85%. **Note**: The 85% is added below the 100% line when the bus voltage is lower than 1 kV.
Arcing Fault	Is calculated base on the bolted fault and the settings you entered in the Bus arc flash section. (See Data entry in chapter 11.2.2)
Max Opening Time	The time it will take the device detecting the fault to open at the Arcing fault value. **Note**: You can click on the opening time value to display a circle on the Time/Current plot curve at the Bolted fault current and opening time. **Note**: The Time format can be changed using the Parameters Set Time Format option.(See chapter 11.3.1.2)
Risk Category	This value will be between 1 and 4 or greater than 4 (>4). This is the result based on the incident energy calculated based on your input. **Note**: The cell background color changes depending on the result. It is set to the color defined in the parameters. It can be changed using the ArcFlash menu option at **Analysis > Parameters > Risk Category** (see chapter 11.3.2). You can also change the energy range using the same option.
Standard / Method	NFPA, IEEE or Lee method depending on the analysis you are running or if the some parameters make the analysis defaulting to the Lee method as mentioned in chapter 11.2.1 Standards.
Full Analysis	Click the  button to launch the full analysis module that gives you access to the tabular report, the warning labels and three different charts. (See Full Analysis at chapter 11.2.4 below.)

Energy Curve	Click on the Show button to view the curves showing the different risk categories. This is to help you find the best settings for the device in order to obtain a smaller risk category . Note that the colors used are the ones defined in the Risk category settings. (See Risk Category in chapter 11.3.2 for more information)	

11.2.4 Full Analysis

Click the Run button, located in the last cell of the industrial reports, to display the following dialog box. Make your selections and click **OK** to launch the full analysis.



The tabular report cannot be customized and comes with a predetermined set of columns. The **Warning stickers** document is one kind of report. Choose its format. They can also be sent to Excel.

The chart reports associate three different types of data together:

- Energy vs. Distance for a constant opening time.
- Energy vs. Time for a constant distance.
- Flash hazard boundary vs. Time.

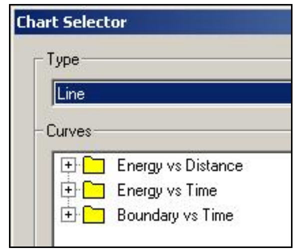
For all charts, choose the X-axis data sampling. This interval of data has a beginning, an end and a step value. Default values are suggested.

For the first two types of charts, there is a constant value. This will have the effect of generating many curves for the same chart. Each constant has a customizable set of data, defined by a minimum, a maximum and a step value.

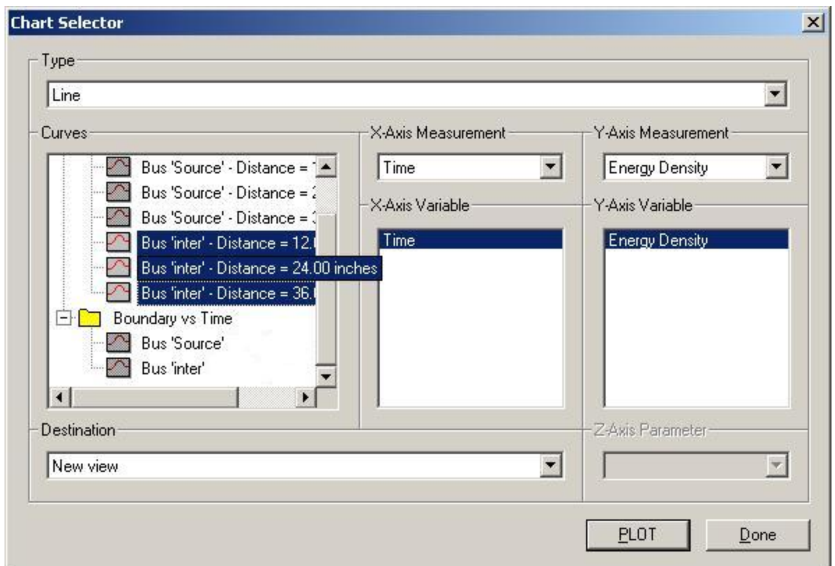
11.2.4.1 Chart Selector Dialog

The chart selector dialog will show up if any of the three types of chart has been selected. All three have a set of curves created for them.

Be careful, because many charts can be stored in a single set of curves. It is up to the user to select the curves that will be shown in a single chart.



In the figure below, pay attention to the name of each curve. Each and every one of them starts by the bus identifier (ID) and ends by the constant name and its value; should it apply.



Clicking the "PLOT" button will create a single chart document with the selected curves data. The user decides which curves are grouped in a single chart.

11.2.4.2 Tabular Report

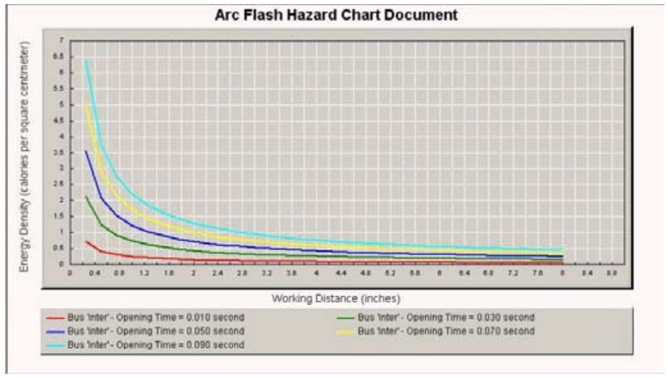
The tabular report lists all buses chosen for simulation with their own characteristics and their significant arc flash results. This table is in read-only mode.

	Bus ID	Voltage (V)	Equip. Type	Circuit Type	Bolted Fault (kA)	Arcing Fault (kA)	Arcing Fault Multiplier	Working Distance (inches)	Bus Gap (inches)	Protective device	Iarc seen by device [A]	Opening Time (ms)	Flash Hazard Boundary (inches)	Incident Energy (cal. / cm2)	Risk Category	Standard
1	2-Bus	14400	Cable	Fixed Circuit Part	10.00	9.71	100%	18.00	0.51	ABB DPU 2000R EI	9706	422	58.37	12.62	3	IEEE-1584

Result columns are at the end. They include: the flash hazard boundary in inches, the incident energy in calories per centimeters squared and the risk category.

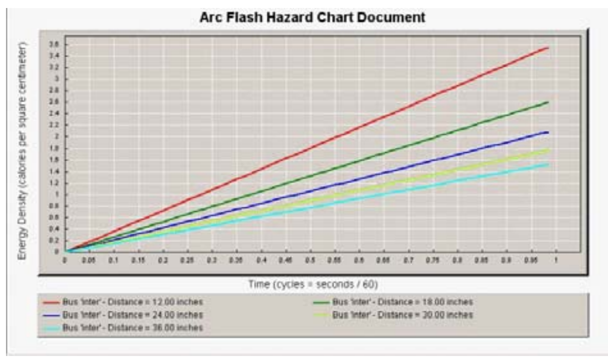
11.2.4.3 Chart Report – Energy vs. Distance for a Constant Opening Time

Here is an illustration of the first type of chart generated:



11.2.4.4 Chart Report – Energy vs. Time for a Constant Distance

Here is an illustration of the second type of chart.

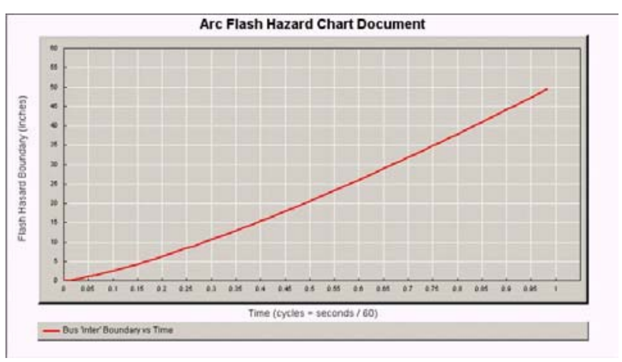


Incident-energy vs. opening-time (arcing-time) curves.

Each curve is related to the specified distance from arc.

11.2.4.5 Chart Report – Boundary vs. Time

Below is an illustration of the third type of chart.



Arc Flash Hazard Boundary vs. opening-time (arcing-time) curves.

Each curve is related to the specified PPE level [cal/cm2]

11.2.4.6 Warning Sticker View

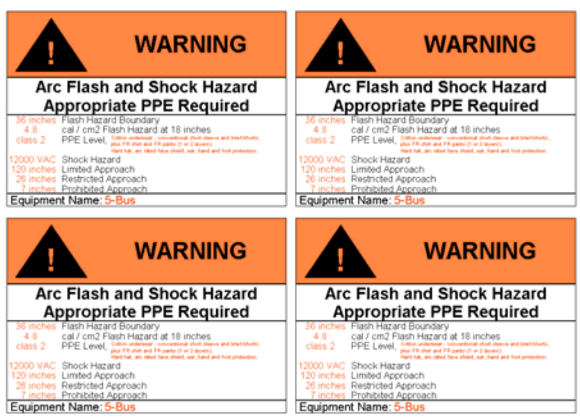
The last type of report consists of warning stickers that can be printed onto special weatherproof adhesive paper. Various standard formats of paper can be chosen. You can buy them from Avery Office Products.

In the context of Arc Flash Hazards, only four of the most relevant formats are made available right now: one-by-one portrait, one-by-one landscape, two-by-two landscape and one-by-two portrait. These are tailor-made to fit very specific Avery's paper products, identified by a product code.

It is possible to choose a format and to print it onto a different paper size than the one it was initially designed. In which case, the labels will automatically and proportionally stretch to the actual paper size. The same thing happens when a different paper orientation is chosen instead of the original one.

Once the labels are printed, they can easily be tagged onto the field equipments to help lower the risk of electrical hazards. Visual information on those stickers includes:

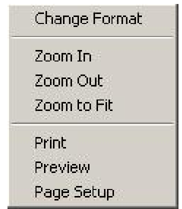
- The flash hazard boundary in inches.
- The energy density in calories per centimeters squared.
- The working distance in question.
- The PPE level and detailed clothing.
- The potential shock hazard current.
- The recommended limited, restricted and prohibited approach boundaries.
- The equipment name identification.



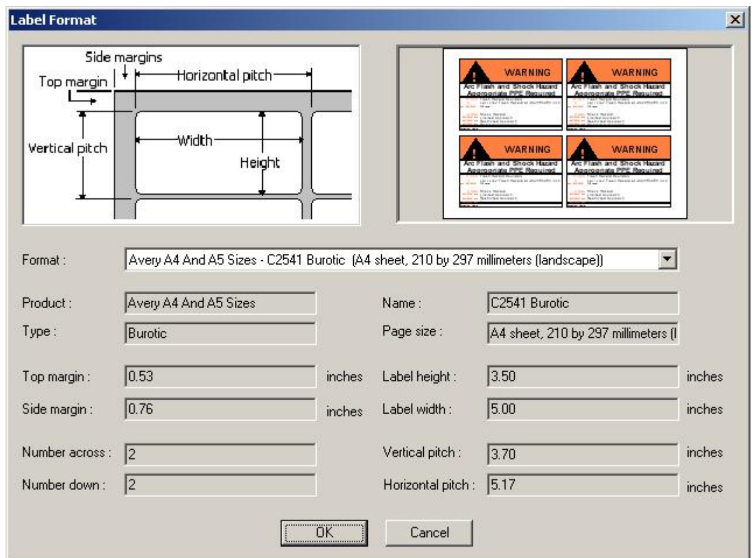
Here are the mouse actions and their corresponding effect in the **Warning Sticker View**:

- **Mouse Double Left-Click:** opens the label format dialog.
- **Mouse Single Right-Click:** pops up the contextual menu.
- **Mouse Wheel:** zooms the actual view in and out.
- **Mouse Right-Click Drag:** pans the actual view in any direction.

From the contextual menu, you can do several operations: changing the label format, zooming in and out, zooming to fit the entire page, printing directly, previewing the printout or adjusting the page setup.

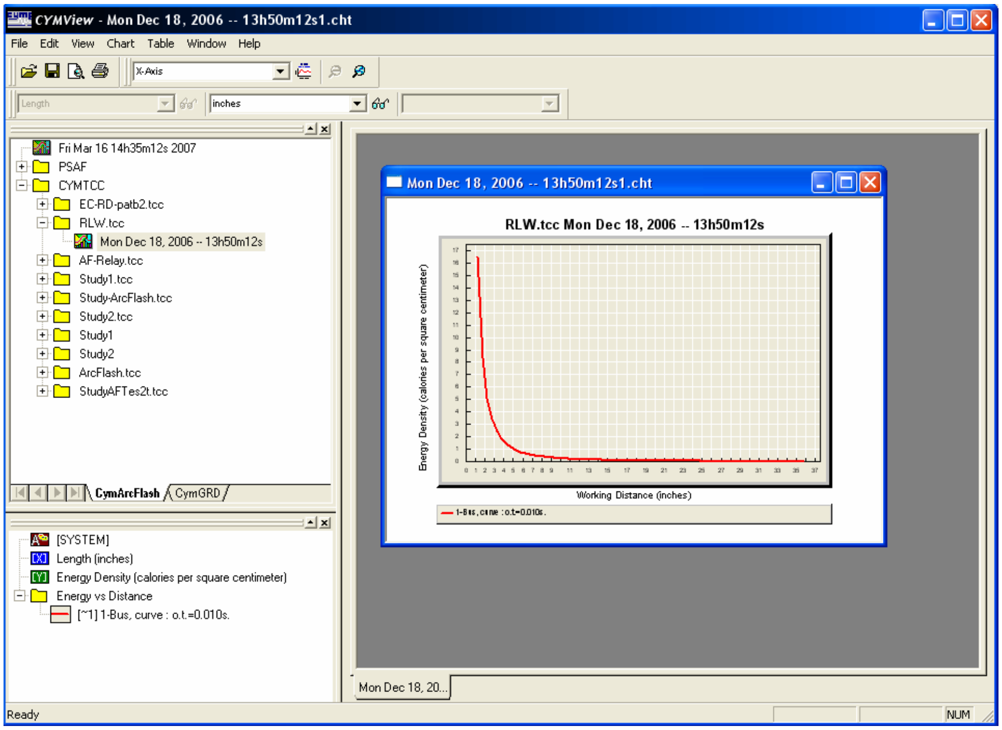


With the label format dialog, you can see the detailed measurements of each label format. You will also have a glance at the look and feel of the actual printout. A combo box lets you choose the format to be used.



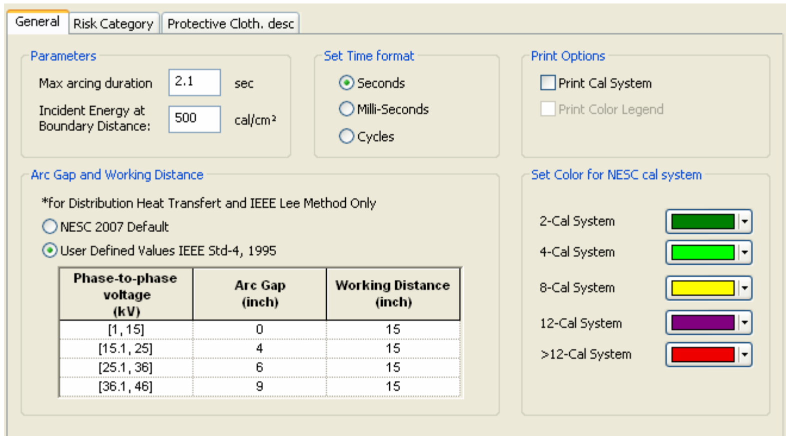
11.2.5 View Existing Chart Report (CYMVIEW)

CYMVIEW is a complementary module that allows viewing the graphical results of the industrial analyses prepared using Arc Flash.



11.3 Arc Flash Parameters

11.3.1 General



11.3.1.1 Parameters

The **Parameters** group box allows the user to indicate two values that will apply to the whole analysis:

- The **Maximum arcing duration** will override the clearing time of any protective device when the opening time of the protective devices is over this value. The IEEE Standard proposes **2 s** and this value will be used as the default. This parameter is used with the hypothesis that an arc flash will not sustain itself for more than the maximum arcing duration value.

- The **Incident Energy at Boundary Distance** value is the energy density protection expressed in calories per centimeters squared. The default value of **1.2** is equivalent to a second-degree burn for bare skin. This parameter is used to calculate the flash hazard boundary which is an approach limit at a distance from exposed live parts within which a person could receive a **1.2 cal/cm^2** electrical arc flash**.**

11.3.1.2 Set Time Format

Will change the maximum opening time format, for all the arc flash analysis reports, to the selection.

11.3.1.3 Print Options

Check the **Print Cal System** checkbox if you would like to print the cal system graphic when you print your study.

To display the cac system graphic in the background of your study, click the **Show Graph** button located in the NESC report. (See the Fields Description in chapter 11.1.4.1)

11.3.1.4 Arc Gap and Working Distance

The options in this group box are available with the Heat Transfer Model to calculate the incident energy. The NESC-2007 tables are based on standard values.

<table>
<tr><td>NESC 2007 Default</td><td>Click on ? to display the Arc Gap and Working Distance window that shows the values utilized by the module's algorithm (IEEE Std-4, 1995).</td></tr>
<tr><td>User Defined Values</td><td>Use the table to enter your own arc gap and working distance.
<table>
<tr><th>Phase-to-phase voltage (kV)</th><th>Arc Gap (inch)</th><th>Working Distance (inch)</th></tr>
<tr><td>[1, 15]</td><td>0</td><td>0</td></tr>
<tr><td>[15.1, 25]</td><td>4</td><td>15</td></tr>
<tr><td>[25.1, 36]</td><td>6</td><td>30</td></tr>
<tr><td>[36.1, 46]</td><td>8</td><td>45</td></tr>
</table>
</td></tr>
</table>

11.3.1.5 Set Color for NESC cal system

Select the color you would like to see for each cal system. Those colors will be used in the Reports (see chapter 11.1.4.1) and on the NESC background plot graphic (See Fields Description /Show Graph in chapter 11.1.4.1).

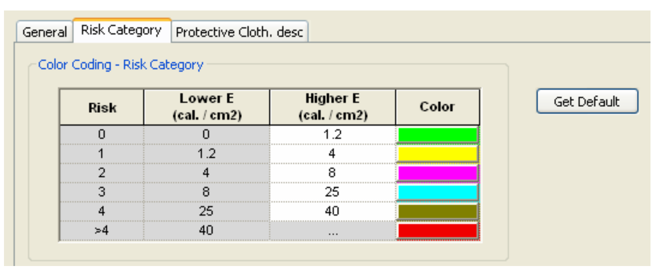
11.3.2 Risk Category

You can specify the lower and higher energy (cal/cm2) limits and the label color associated to its risk category. The colors will also be used in the reports.

Those settings are used only by the Industrial analysis.

Click the **Get Default** button to go back to the original text that CYMTCC's providing.

Note that these colors are also used when the Show Energy graph option in the report is activated.

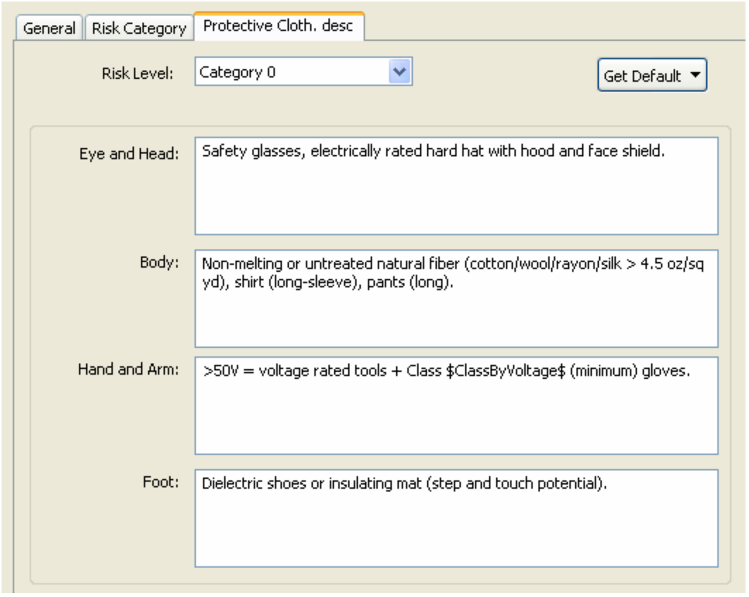


Risk	Lower E (cal. / cm2)	Higher E (cal. / cm2)	Color
0	0	1.2	
1	1.2	4	
2	4	8	
3	8	25	
4	25	40	
>4	40	...	

11.3.3 Protective Clothing Description

You can change the label text for clothing description that will appear on the label generated when running an industrial IEEE or NFPA analysis. Select the **Risk level category** and change the text associated with the body part. Make sure you click **Save** after you are done with the modifications. You'll be prompted if you don't.

Click the **Get Default** button to go back to the original text that CYMTCC is providing.



Chapter 12 The Tools Menu

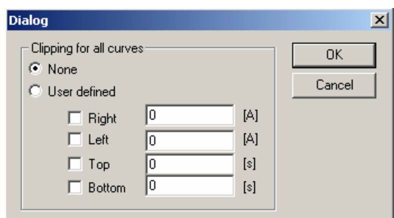
12.1 Fast Adjust

Activates the **Fast** Adjust drag mode allowing you to move the selected curve directly on the plot.

Note:	The Fast Adjust dialog box is located in the Multi-Explorer. (See Fast Adjust Tab in chapter 16.8)

12.2 Clipping for all Curves

Allows you to clip all the curves from your study at a certain current and / or time.



Note:	If this option is enabled, the short-circuit clipping will not be working.

12.3 Batch Modification in Opened studies

This option allows you to modify the device voltage, the coordination values, the curves color, the short-circuit values, the tags of one or more device type and the grid options, etc. in the current study or in all the opened studies.

This feature is very useful when you have many studies for the same project and you would like all your studies to look the same. For example, to use the same look for the grid or make all your fuse curves color the same. Or, if you add the short-circuit current in your tags and would like to apply this change to your existing studies, this is the tool to use.

Basically, it can modify almost any parameter of the devices included in all your opened studies.

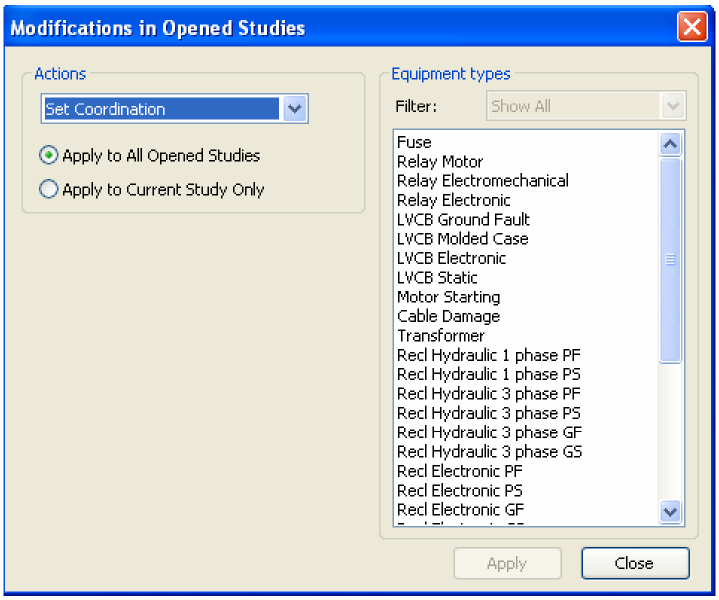
How does it work?

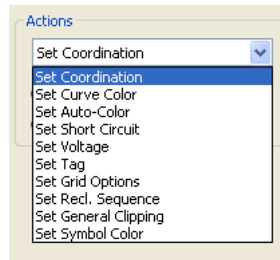
1. Select the action you would like to perform.
2. Specify if you would like to apply the changes to all the opened studies or only the current study.
3. Depending on the action selected, you might have to enter extra information, located below the **Actions** group box. The extra fields are specific to the selected action.

4. Select one or many Equipment type(s) you would like to apply the modification (action) to. You can use the CTRL or SHIFT key on your keyboard to do a multiple selection.

5. Click the **Apply** button to launch the modification. If you have selected an action different than the voltage or the tag, a dialog box will appear to allow you to choose or modify the equipment type's parameters.

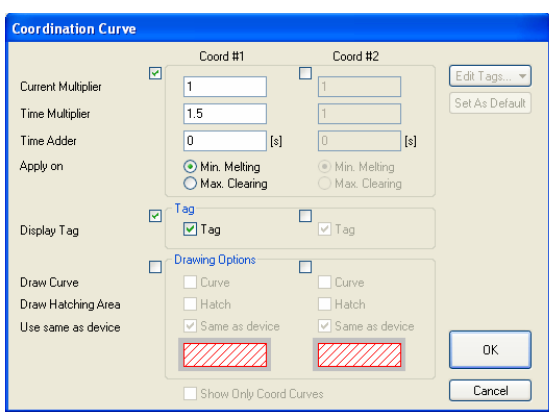
6. In the **New** dialog box, you will have to check box(es) of the properties you would like to modify.





12.3.1 Coordination

With the **Set Coordination** action, when **Apply** is clicked, the **Coordination Curve** dialog box appears. Enable the checkboxes next to the settings you would like to modify. Make your modification and click **OK**.

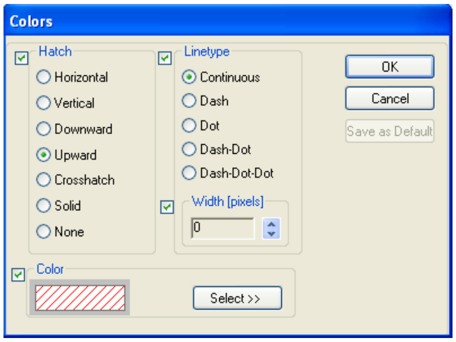


12.3.2 Colors

The **Set color** action changes the color of the curves in your studies.

When **Apply** is clicked, the **Colors** dialog box will appear. Check the boxes next to the settings you would like to modify. Make your modification and click OK.

Note:	The items that are not checked will not be changed in the existing devices. For example, you can choose to change only the line width so the curves keeps all there other settings (Hatch, color and line type).



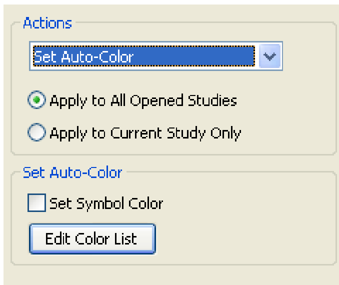
12.3.3 Auto-Color

The **Set Auto-Color** function is used to change the color of the curves in your studies.

The color list can be defined using the **Tools > Auto-Color** dialog box (see 12.3.3) or by clicking the **Edit Color List** button.

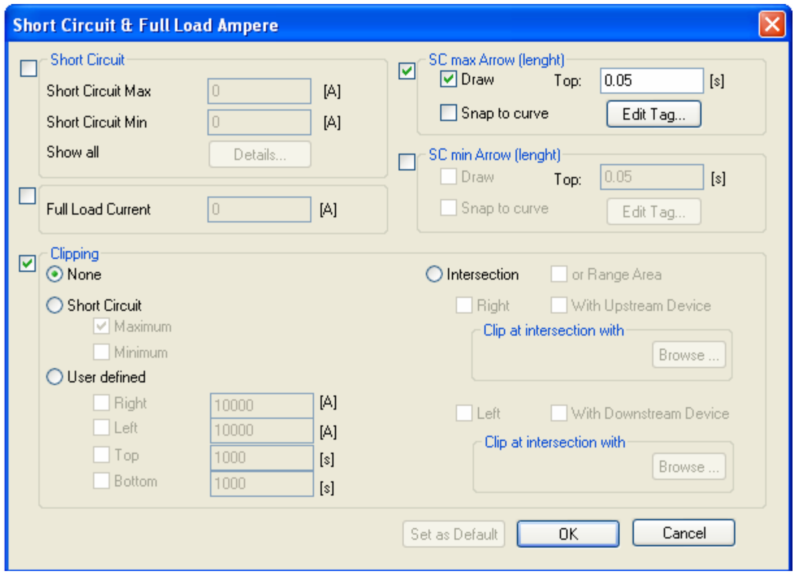
The device with the smallest device number will be change to the first color found in the list; the second smallest number will be changed to the second color from the list and so on.

If you would like the symbol color to match the curve color, check the box Set Symbol Color.



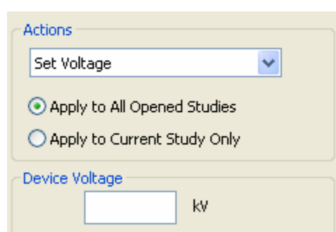
12.3.4 Short-Circuit

The **Set Short-Circuit** action allows you to change any of the parameters available in the Short Circuit & Full Load Amperes dialog box (see 5.3.6 for details about the functions in this dialog box).



12.3.5 Voltage

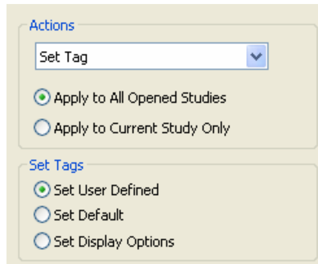
The **Set Voltage** action will change the device voltage of the selected type of devices to the value you have entered in the **Device Voltage** group box that is displayed once selecting this action.

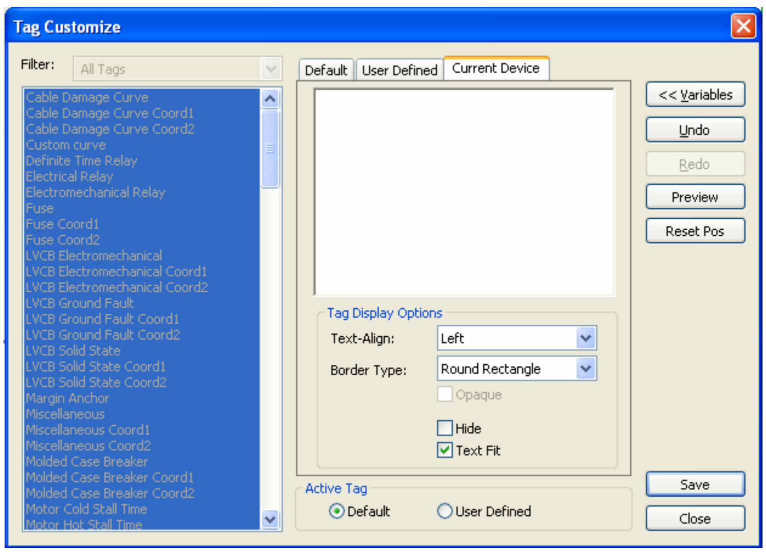


12.3.6 Tag

The **Set Tag** action displays three choices. You can reset your tags to use the User defined or the default tag parameters, or change the tag parameters using **Set Display Option**.

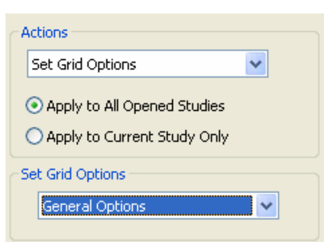
If the **Display** option is selected, when the **Apply** button is clicked, the **Tags customization** dialog box will open but only the portion related to the display options will be enabled. (See **File > Preferences > Tags Customization**, section 3.10.5).

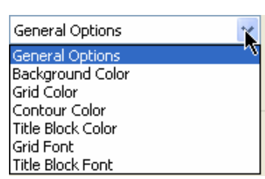




12.3.7 Grid Options

This option allows you to change any parameters of the grid. Once selected, the dialog box will display the **Set Grid Options** group box where you will be able to select more specific features.





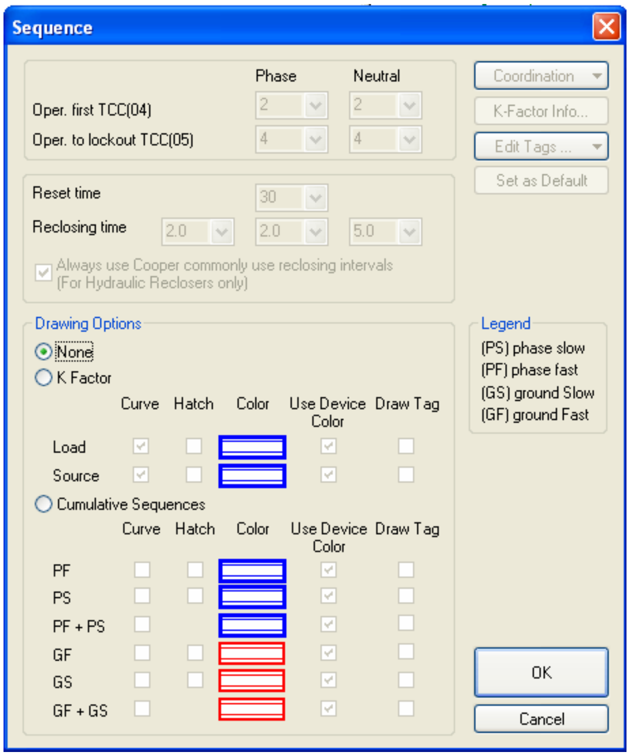
General Options will open the **Grid Options** dialog box (see 6.11.1). Enable the checkboxes next to the settings you would like to modify, make your modifications and click **OK** when done.

The **Background**, **Grid**, **Contour** and **Title block color** options will open a color properties dialog box.

The two **font** options will open the font dialog box when apply is clicked. See 3.10.4 Font for Grid and Font for Title Block for details.

12.3.8 Recl. Sequence

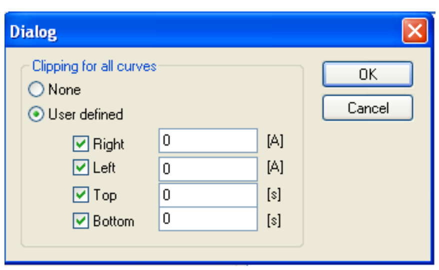
The **Set Recl. Sequence** action allows you to change the drawing options (curves colors) of the Recloser Cumulative and K-Factor curves, not the actual settings. When **Apply** is clicked the **Recloser Sequence** dialog box will open, the top portion is disabled (see 5.5.1).



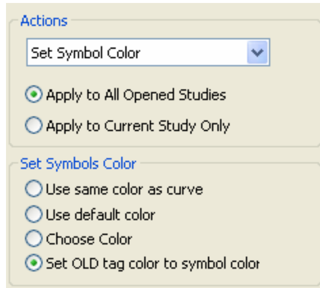
12.3.9 General Clipping

Allows you to clip all the curves of all the opened studies in any direction.

See **Tools > Clipping for all Curves**, section 12.2, for more information.



12.3.10 Symbol Color

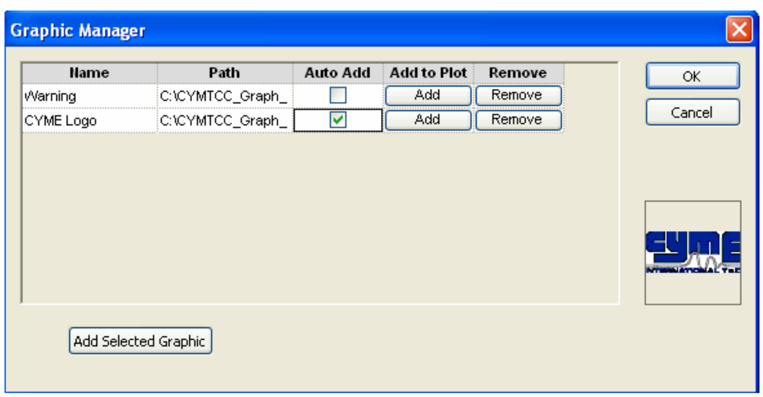


Use the **Set Symbol Color** action to apply changes to the symbols of the opened studies:

- Use the same color as the curve for the symbols.
- Set the default color for the symbols. (See **File > Preferences > Colors**, section 3.10.3)
- The **Choose color** option opens a **Color preferences** dialog box when the **Apply** button is clicked.
- Set the color of the One line diagram tag to the color of the symbol.

12.4 Graphic Manager

The **Graphic Manager** gives you the possibility to add graphics to a list. This list is saved in your initialization file so it is always available.



To add a new graphic to the list, first paste it to the plot (See **Edit > Clipboard > Paste to plot Clipboard**, section 4.14) and then double-click on it.

This will open the **Graphic Manager** dialog box. Click the **Add Selected Graphic** button, the **Save as** dialog box will open; select where you would like to save your graphic. The position and the size of the graphic are also saved.

Select the graphics you want to open automatically when creating a new study by checking the **Auto Add** checkbox.

Use the **Add** button to insert the graphic to the plot.

The **Remove** button deletes the entry from the list, not the graphic from the plot. To remove the graphic from the plot, select the graphic in the plot and press the **Delete** key on your keyboard.

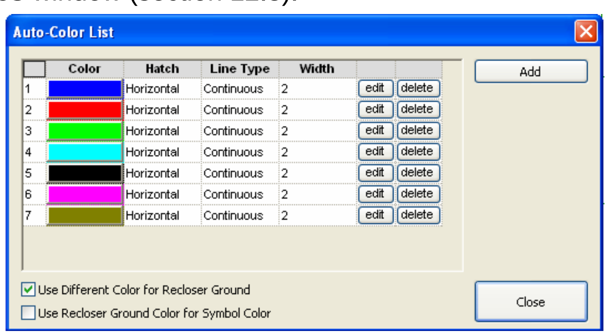
To change the name in the **Name** field, double click on it and type in the new name.

To change the position of a graphic that uses the **Auto add** option, add the graphic to the plot, use the **Add** button and close the **Graph Manager** dialog box. On the plot, move your graphic to its new location and right-click on it. Select **Set new position** in the popup menu.

12.5 Auto-Color List

This option is used in conjunction with two others options.

1. If you are using the interface between CYMTCC and CYMDIST or PSAF, you can specify in the **CYMTCC Project Database Properties** dialog box that you would like to use this color list when devices are exported to CYMTCC. (See 13.10 Settings Database Manager(TCS))
2. It is also used it with the **Set Auto-Color** option in the **Batch Modification in Opened studies** window (section 12.3).



Click **Add** to insert a new color. The same dialog as the **Create > Common > Colors** will open (see 5.3.9). Make your selection and click **OK** in that dialog box when you are done. A new line will be added to the list. To remove it, click the **Delete** button at the right end of the line. To make a modification, click the **Edit** button. You can also directly click on the color button in the **Color** column to modify it.

If the **Use Different Color for Recloser Ground** option is checked, when a recloser ground curve is modified, it will take the next color in the list.

If the **Use Recloser Ground Color for Symbol Color** is checked, the symbol will be of the same color than the ground curve(s). Note that the option **Use curve color for symbol** needs to be selected at the **Settings Tab** (also called Project window) of the Multi-Explorer (see 16.3) or at the **Batch Modification in Opened studies** window (section 12.3) in order for this to work.

12.6 Backup Configuration Files (INI) Manager

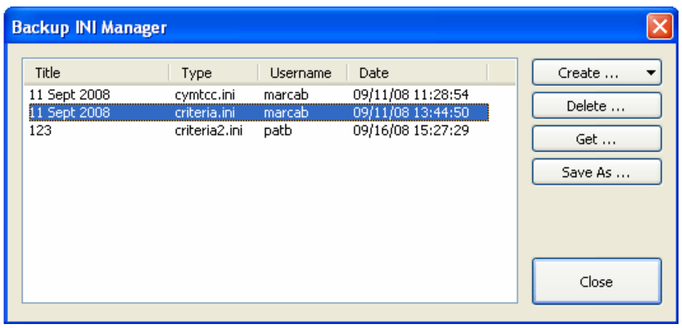
This option allows you to make a backup of your configuration files which are:

- **Cymtcc.ini** CYMTCC
- **Cyme.ini** Protection key setup
- **Criteria.ini** Coordination, reach, loading and protection analysis criteria.

Your file(s) are automatically saved in the active library file (See **Database > Change Library** Database, section 13.2).

Note:	This option is very useful when you have many users sharing the same database and you want them to use the same settings and criteria.

Note:	Entries below the criteria.ini in the Create popup button are extra criteria files. (See **Analysis > Coordination Criteria**, section 10.4, for more information.)



Create	Select in the popup menu the file that you want to backup. You will be prompted to enter a title to identify your backup.
Delete	Remove the selected line after the validation confirmation.
Get …	Replace your existing file with the selected one. Before the operation is completed, you will be prompted to make a backup of your existing file.
Save As …	Retrieves the selected file. You have the possibility to specify a new path and name through a **Save as** dialog box.
Close	Exits the dialog box.
Title	The name that was entered when the backup was performed.
Type	Name of the INI file that was backed up.
Username	The name of the user that performed the backup. If your database is shared, you might see a different name.
Date	The date and time when the backup was executed.

12.7 Export Fuse Ranges

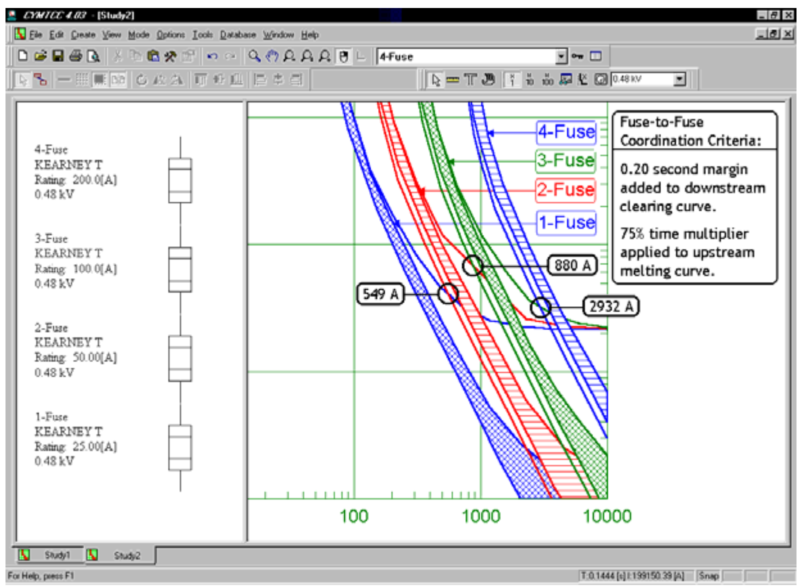
Hint: This function is mostly useful to the CYMDIST users who want to evaluate candidate fuse ratings for lateral circuits in their distribution feeders.

This function identifies the range of short circuit current (minimum to maximum) for which a series of fuses coordinates. It helps you standardize on certain fuse makes and ratings.

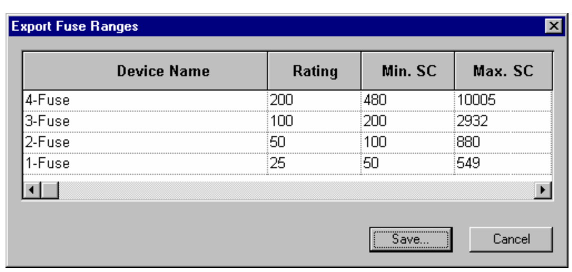
You may save in a CSV (comma-separated variable) file the fuse ratings and the range of short-circuit current for which each fuse will coordinate with the next fuse upstream. CYMDIST users will import this CSV file and it will become the basis for color-coding the feeder diagram. Please refer to the CYMDIST Reference Manual (version 3.04 and later).

Note: It takes into account your Coordination Criteria (section 10.4)

Example: The user places four candidate fuse ratings in the study. See the illustrations below.



Study with Coordination Criteria drawn explicitly



Export Fuse Ranges

Device Name	Rating	Min. SC	Max. SC
4-Fuse	200	480	10005
3-Fuse	100	200	2932
2-Fuse	50	100	880
1-Fuse	25	50	549

Save... Cancel

Report of fault currents for which the fuses coordinate

Conclusion: The 25 A fuse coordinates with the 50 A fuse for fault currents up to 549 A. The 50 Afuse will not coordinate with the 100 Afuse beyond 880 A, and the 100 A fuse will not coordinate with the 200 A fuse beyond 2932 A.

12.8 Export Settings to CYMDIST

This function sends the Settings for the devices in the active study to CYMDIST for information purposes. Please refer to the CYMDIST manual.

Chapter 13 The Database Menu

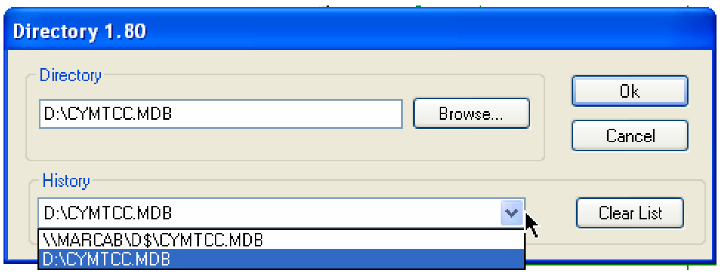
13.1 Overview of the Database Menu

The Database menu comprises functions that allow you to manage the contents of the library of devices and manage the databases you may need to create for your needs.

13.2 Change Library Database

The Change **Library Database** menu command allows changing the **Device Library file (MDB extension)**.

Note:	All devices used in a study must be present in the same Library file. To copy missing devices to a Library directory during a study, see Section 13.5.2 Export.

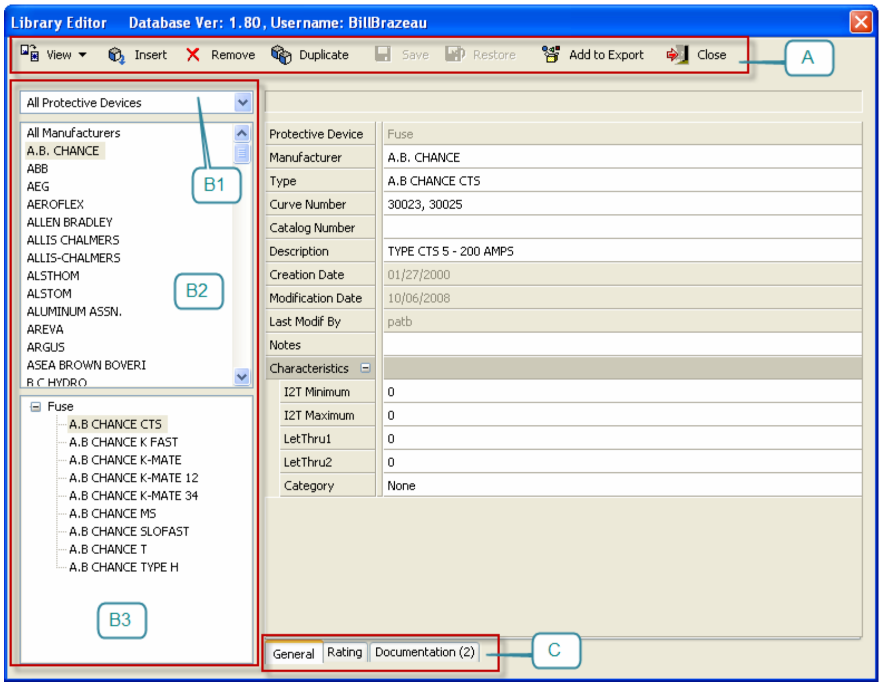


Use the **Browse** button to select the library file, or type in the full path and the file name.

Use the **History** list to get the list of previously used files.

13.3 Library Editor

The **Library Editor** is used to manage the library file that contains all the devices used by CYMTCC.



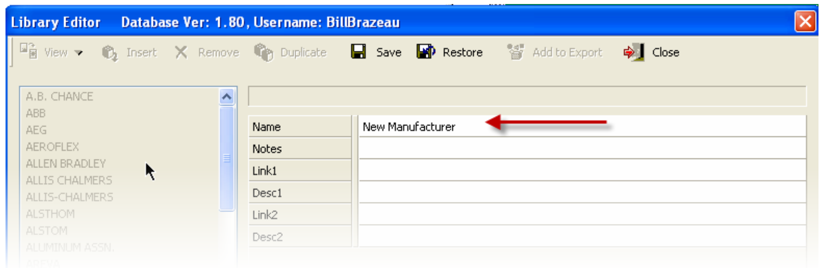
The Graphic User Interface in the Protective device view:

- **A**: Toolbar
- **B1**: Device Type Selection
- **B2**: Company Selection Box
- **B3**: Type Selection Box.
- **C**: Tabs → switch between General, Curves or Rating or Sensor/Band/Multiplier and Documentation. See General Tab in chapter 17.1, Curve/Rating/Sensor Tab in chapter 17.2 and Documentation Tab in chapter 17.3.

Note:	The second tab text will change depending on the device type selected. The information shown at this tab is about the curves or rating of a device.

Toolbar

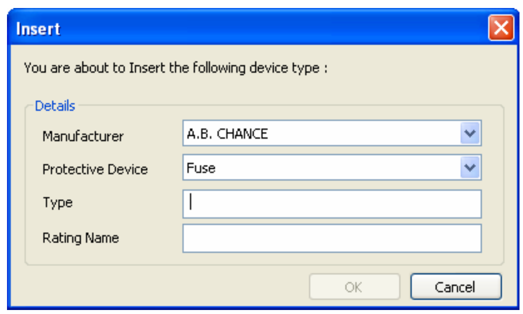
View	Allows you to switch between the different Views (See chapter 13.3.1 for more information).
Insert	Allows you to add a new Device type or a Curve depending which tab is selected. **Note**: When View is in a different mode than Protective Device, no dialog box will open. Instead, you will have to change the name in the **Name** field.

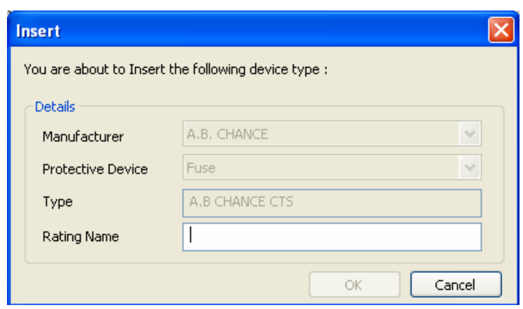
<table>
<tr>
<td></td>
<td>


On the first image below, **Insert** was clicked while on the **General** tab. Enter the new **Type** and **Rating Name**.

On the second image, **Insert** was clicked while on the **Rating** tab. Enter the new **Rating Name**.

Click **OK** to confirm the insertion. Click the **Save** button to complete the operation.





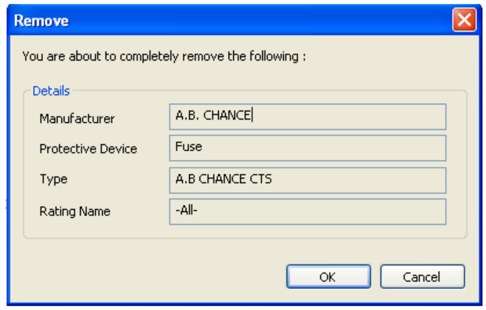
</td>
</tr>
<tr>
<td>Remove</td>
<td>

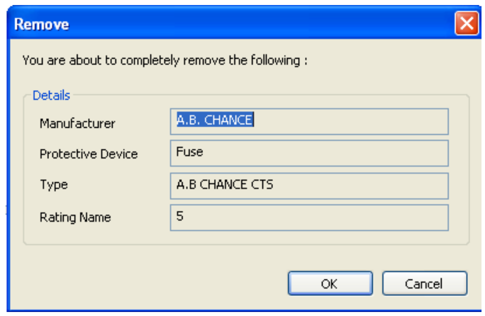
Deletes the selected **Type** or **Curve** depending which tab is selected.

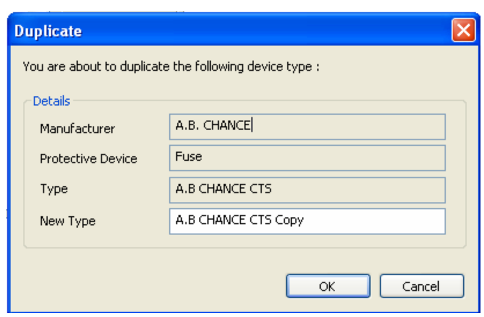
Below, in the first image, the **Type** is completely deleted including all the ratings.

In the second image, the **Remove** button was clicked while on the **Rating** tab. Only the selected rating is deleted.

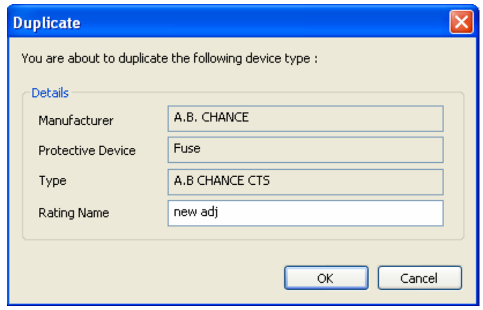
Click **OK** to confirm the operation. When **OK** is clicked the item will be definitely deleted.
</td>
</tr>
</table>

<table>
<tr>
<td></td>
<td>




</td>
</tr>
<tr>
<td>Duplicate</td>
<td>
Creates a copy of the selected device or selected curve, depending on the tab selected. This function is very useful when you want to test an existing curve and you don’t want to modify the existing data.
On the first image below, the Duplicate button was clicked while on the General tab. Enter the New Type name and click OK to confirm the operation. In this case, all the ratings of the selected fuse will also be duplicated.
On the second image, the Rating tab was selected. Enter the new Rating Name. Only the selected rating will be duplicated.
In the two cases, make sure you don’t enter a name that already exists.


</td>
</tr>
</table>

	
Save	Saves the modified device to the database file. **Note**: The button will be enabled when a modification to the database has being made.
Restore	Cancels the modification that was made to the selected item. It will be reset to the state before the modifications were made. **Note**: The button will be enabled when a modification to the database has been made.
Add To Export	Will add the selected type to the **Export list** used by the **Export** option (see chapter 13.5.2for more information).
Close	Closes the **Library Editor** dialog box. If you have made a modification to the library, you will be prompted to save your changes.

13.3.1 Views

13.3.1.1 Protective Devices

Manage Fuses, Relays, Reclosers and Low voltage circuit breakers.

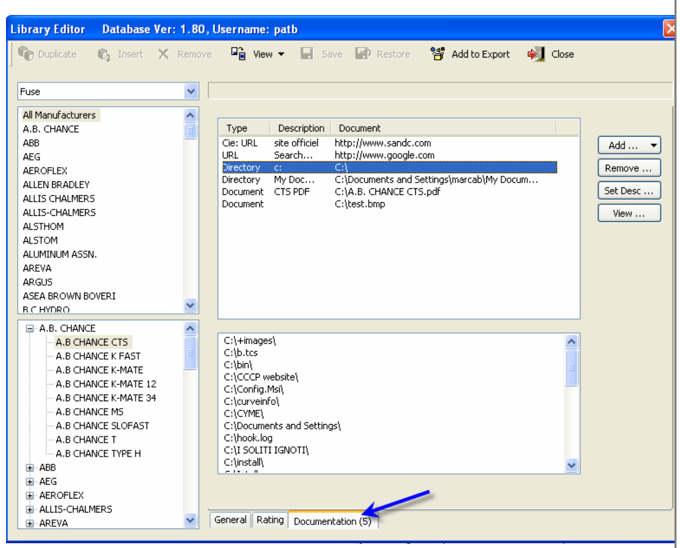
Navigation

All the protective devices are listed in the drop down box on the top left corner, below the toolbar. To see all the Manufacturers and the Types of a particular device, select it from the list. The Manufacturers will be listed below the drop down list. When a Manufacturer is selected, all its types will be shown in the list located below.

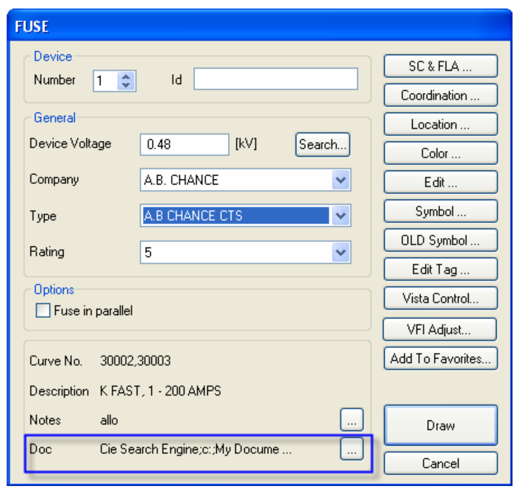
You can also list all the devices and types of a particular manufacturer by choosing **All Protective Devices**, and then selecting a company in the list box below the drop down list of protective devices. Below the Manufacturer, the list is presented as a two-level tree view. The first is the Protective Device and its children, with the related types at the second level.

To modify an existing curve, click on the curve type in the list at the bottom left corner of the dialog box. The right-hand portion of the dialog box will display the information about the type selected.

Tabs

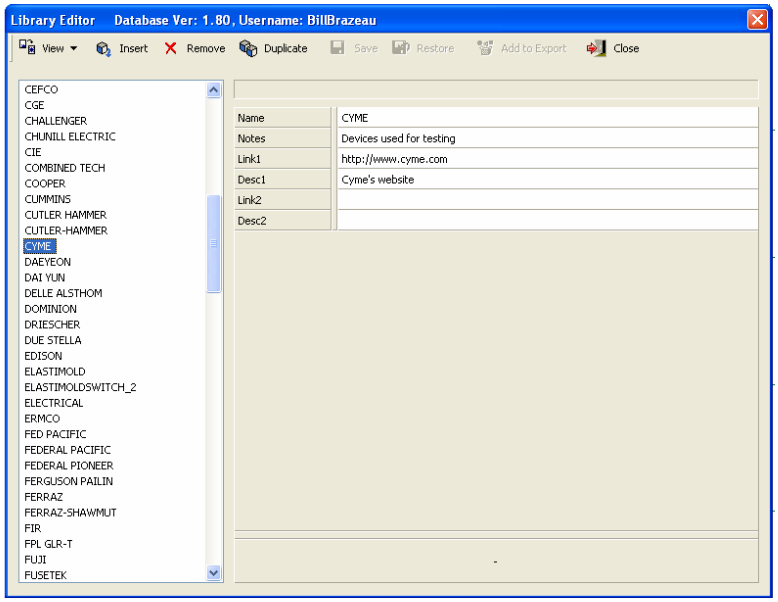
<table>
<tr><td>General</td><td>
The top portion contains information on the selective device such as company, name, curve number, catalog number, description, creation date, modification date, name of the user who did the last modification, notes, and warning message.
<u>Notes</u>: If the device was never modified by a user, the Modification date and Last modification by fields will not be shown.
The Characteristics group box contains general information for the type of device (Fuse, Relay, Reclosers and relay) that is currently selected. For example, if a fuse is selected, I^2T, Let thru and the Category fields are available. The information contained within those fields are for the selected type only.
</td></tr>
<tr><td>Curves/Rating</td><td>
The top portion contains the list of available curves and parameters. The parameters include: interrupting rating, minimum and maximum kV and the X/R ratio.
The bottom portion is related to the selected curve. Here, the fields will be different depending on the type of device and the type of curve(s) used by the devices.
</td></tr>
<tr><td>Documentation</td><td>
The documentation option allows you to store documents such as PDF files of curves, pictures of the device or a website URL about a specific device.
The top portion shows the documents for the selected type. The bottom is a preview of the selected document. Only the directory and image file type will show something.


</td></tr>
</table>

Add	Select the Files, Directory or URL from the drop down menu. A dialog box will show up so you can make your selection. If you have selected **File**, you can make a multiple selection.
Remove	To remove the line from the list. It does not delete the file from your computer.
Set Description	To change the description of the selected document. This is the string that will be visible in the device dialog box. More info below.
View	Opens the selected document. This documentation (**Doc**) field is located at the bottom of every **Device Properties** dialog box. It is showing the description you have entered previously. Clicking the  button will open the **Library Editor** at the **Documentation** tab. 

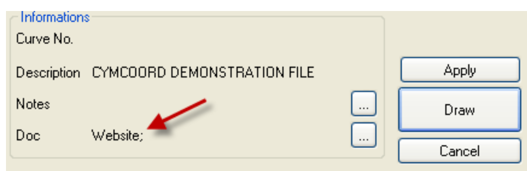
13.3.1.2 Manufacturer

Manage the manufacturer list.

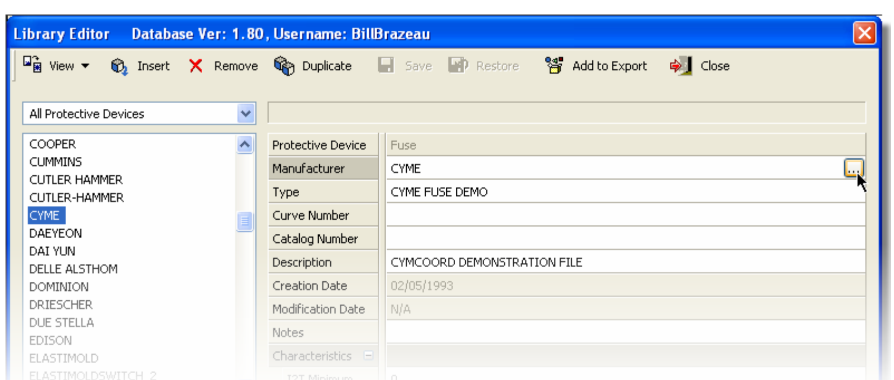


You have the possibility to add two web links along with each a description.

If one link is present, the **Device Properties** dialog box will show its description in the document (**Doc**) information field.

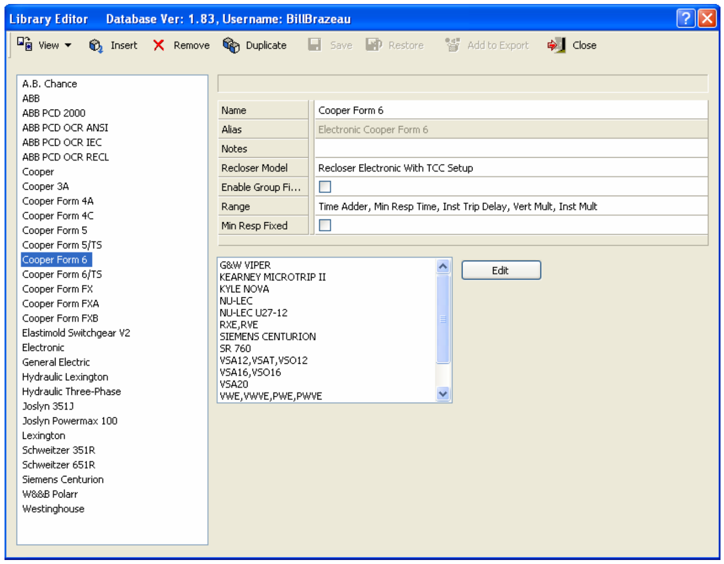


In the protective device view, the manufacturer can be changed by clicking the ... button. A list containing all the manufacturer names will appear from which you can make your selection.



13.3.1.3 Recloser Control Types

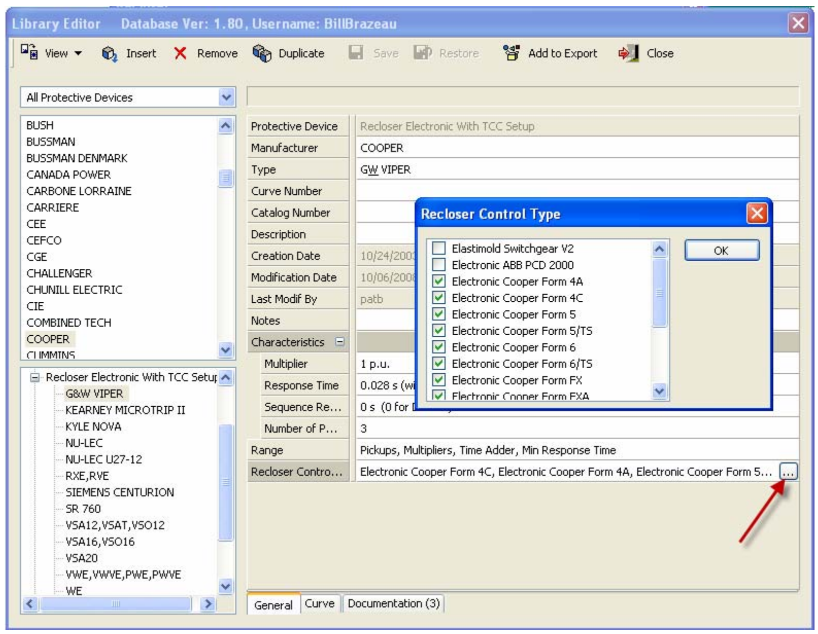
Use this view to add, delete, rename or modify your control types used with the reclosers.



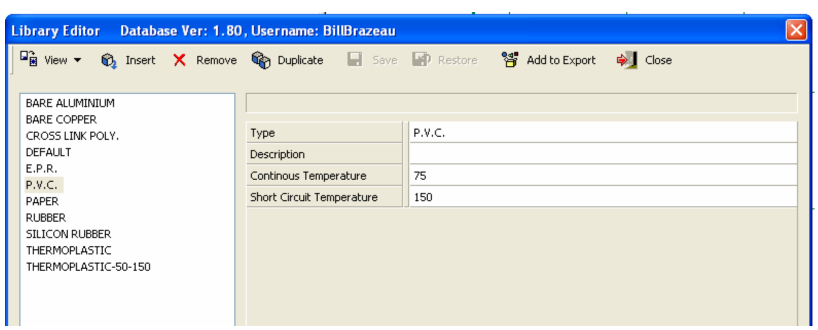
Name	The name that will appear in the **Recloser settings** dialog box.
Alias	The name that was used in the CYMTCC version 4. This field can not be modified.
Notes	Information field.
Recloser Mode	Select one of the four models available. (See Recloser in chapter 5.5 for more information)
Range	To specify the different ranges for the setup TCC and High Current Trip (for the reclosers with the TCC setup only) (see 5.5.2 Electronic with TCC Setup).
Min Resp Fixed	Check this box if the **Minimum response time** is not modified by the multiplier. For now, only the *Schweitzer* control types behaves this way.
Type list	Displays the name of the the type included in the selected Control type. Click the **Edit** button to edit the selected type.

Adding a Control Type to existing reclosers

1. Select a recloser type.
2. Under the **General** tab, click the ... button on the **Recloser Control Type** line.
3. A dialog box containing all the control type available for this recloser model will be listed. Check the box next to the new control type you would like the selected type to be listed in.
4. Uncheck the box to remove the type from the control type.

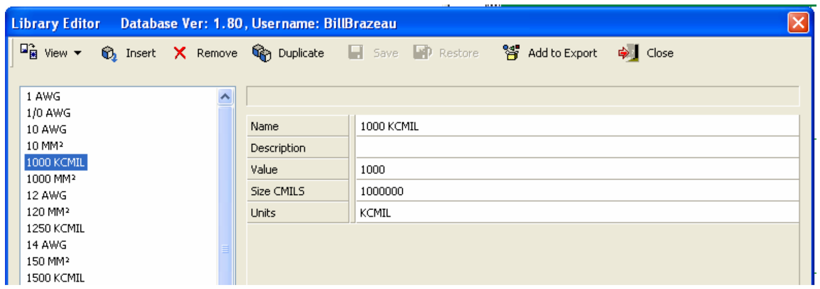


13.3.1.4 Cable Insulations



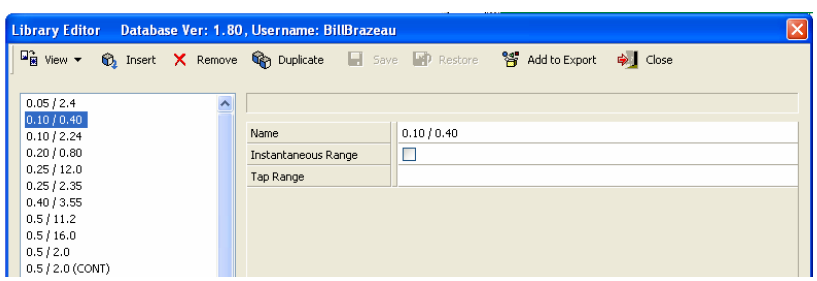
Type	Is the name of the insulation type that will appear in the list.
Description	Is a space for a remark concerning the insulation.
Continuous Temp.	Is the rated maximum continuous temperature (in °C).
Short-Circuit Temp.	Is the temperature (in °C) reached during a short circuit.

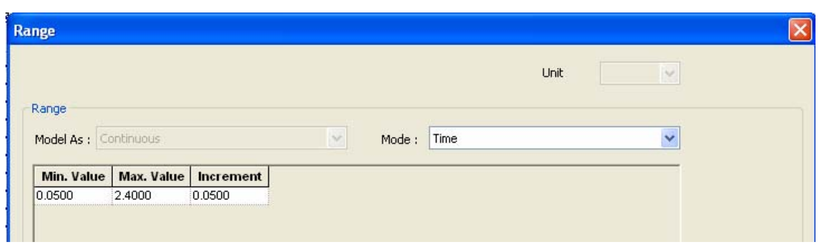
13.3.1.5 Cable Sizes



Name	Is the name that will appear in device lists. Give a unique, meaningful name.
Description	Is a space for a remark concerning the cable.
Value	The value entered here is used for sorting purposes. Enter the same value entered in the Name field without the unit. If no numerical value can be used, just enter 1.
Circ. Mils	Is the cross-sectional area of the conductor, expressed in circular mils. (Note that 100 mm^2 = 197350 *cmil* = 197.35 *kcmil*))
Units	Is used by CYMTCC to filter the size list by unit.

13.3.1.6 Relay Tap Ranges





This dialog box is obtained when clicking on the ... button on the **Tap Range** line.

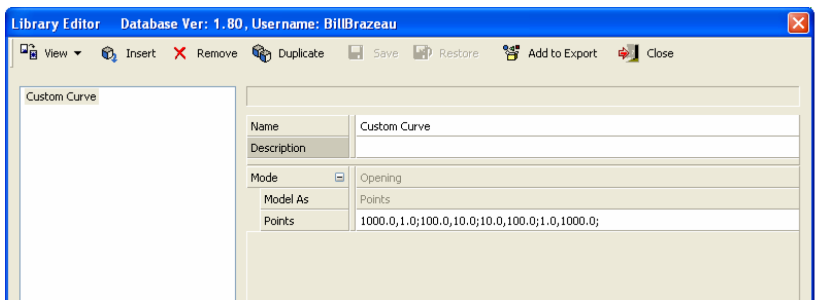
Name	Is the identifier that will appear in the list in the **Relay** dialog box in CYMTCC.
Inst. range	Defines whether the tap range applies to *long time* (☐) or *instantaneous* (☑) operation.

Tap Range	Click the ... button to edit/enter the tap range.
Model As	Defines whether the tap range has all taps evenly distributed or fixed at discrete values.
Taps	List of fixed taps in a *discrete* model.
Min. Value	Is the lowest tap in a *continuous* model.
Max. value	Is the highest tap in a *continuous* model.
Increment	Is the interval between each tap in a *continuous* model.

13.3.1.7 Transformer In Rush

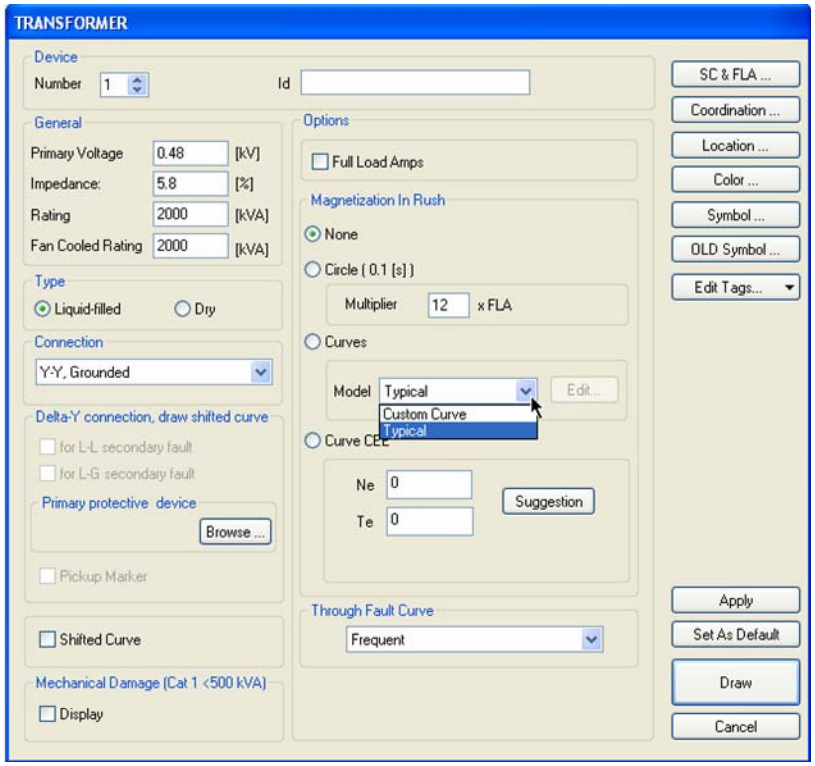
To manage your Inrush curves.

By default, the typical curve is available in the **Transformer** dialog box.



This curve can only be modeled as points.

Click the ... icon on the **Points** line to edit the points.



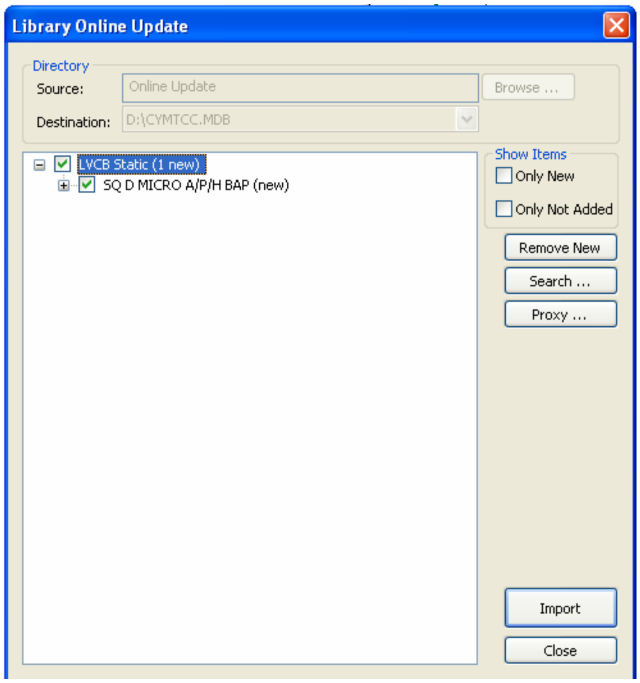
The curves you have created will be available in the **Transformer Settings** dialog box in the **Model** combo box located in the **Magnetization In Rush** group box.

13.4 Library On-line Update

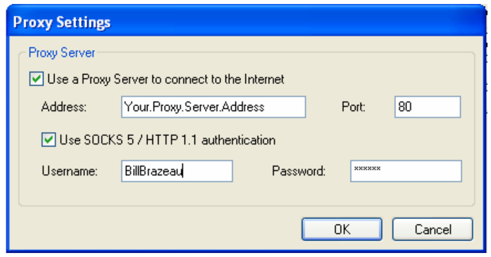
This command allows you to download new curves to your **Device Library** (database) by automatically connecting the CYME web site.

This feature is designed to keep your library up-to-date between the releases of new versions of CYMTCC. Also, if you request a new curve from CYME, we will place it on our web site. You will be able to obtain it from there via this menu command.

Note: Your computer must be connected to the Internet before you choose this function.



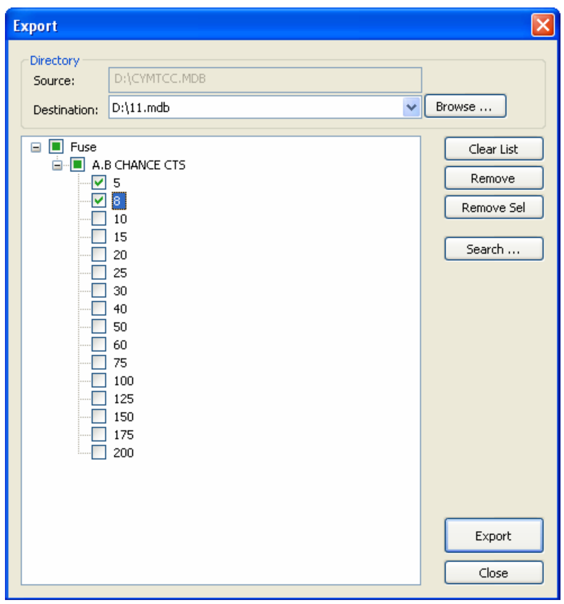
- The curves are grouped by device type in a tree view style.
- You can select many items at once by clicking on a parent item (Company level or device-type level).
- All the selected items will be added when the **Import** button is clicked.
- You can view all the devices that are available or view only the new entries or the curves that are not available in your database by choosing the proper option in the **Show Items** section.
- If you click the **Remove New** button, the flag *(new)* on the devices will be removed. So, if you have selected the **Only new** option in the **Show items** group box, no items will be listed until a new device is added by CYME.
- If you position the mouse cursor over an item, a tooltip will give you more information about this item.
- You can use the **Search** option to help you locate a specific type.
- Click on the **Proxy Settings** button to enter the **Address**, **Port**, **User Name** and **Password** needed to access the Internet through a proxy server.



13.5 Import/Export

13.5.1 Overview

These options are used to copy curve data from one database file (MDB) to another.



- You have to specify a source or a destination database file by using the **Browse** button to select an existing file or you can enter a non-existing file name to create a new empty database file.
- You can use the drop down list to select a database file. The last files used will be displayed.
- You can export or import the entire list of devices by clicking the **Select All** button and then **Export** or **Import.** You can also select only one specific element, fuse rating for example.
- When you are done exporting, your can click the **Clear List** button to remove all the items so they will not be listed the next time you use this function. You can also use the **Remove Sel** button to remove only the selected item or **Remove** to remove all the checked items. (Only when using the Export option)
- If you are looking for a specific device, use the **Search** option.
- You can right click on the list of devices and select one of the following commands: **Expand All**, **Collapse All**, **Check All** and **Uncheck All**.

13.5.2 Export

Before using this option, you will have to add the curve to the **Export List**. This can be done from the **Library Editor** by clicking **Add to Export** or from the **Search Results** window when selecting **Add** to export from the popup menu obtain by right clicking on a device name.

13.5.3 Export Modified Devices

This option works the same way as the **Export** command except that only the curves that were modified by users in the **Library Editor** will be listed.

Note:	This is a good tool to use to make a backup of the curves you have created or modified.

13.5.4 Export Study Devices

This option works the same way as the **Export** command except that only the curves in the current study will be listed.

Note:	Useful if you want to keep the curve data along with the study.

13.5.5 Export Studies Devices

This option works the same way as the **Export Study Devices** command except that the curves of all the opened studies will be listed.

13.5.6 Import

Very similar to the **Export** option, except that you have to specify a source file instead of a destination file.

13.6 Compact/Repair

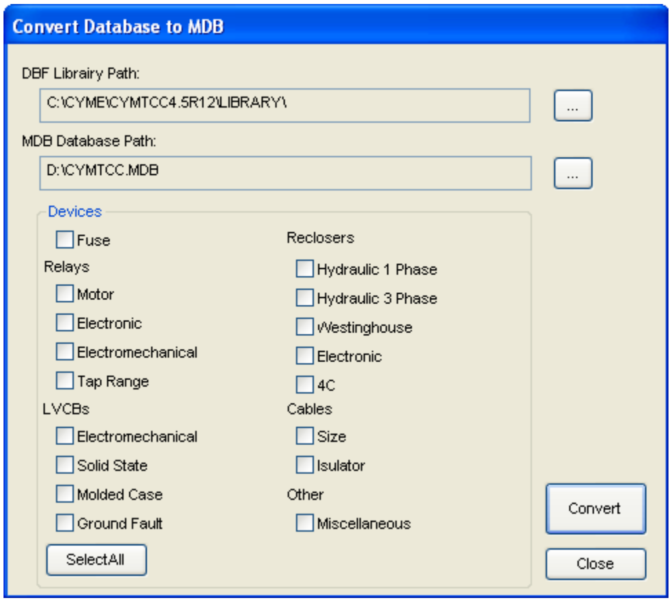
If you experiment problems with the database, you can try to use this option. It will re-index the database file and compact it.

13.7 Convert (DBF to MDB)

This option will convert your CYMTCC V.3 or V.4 databases to the new CYMTCC V.5 format (MDB).

The CYMTCC 5.0 installation package includes a database file containing all the existing devices.

If you have created devices, use this tool to convert your database to the new format.

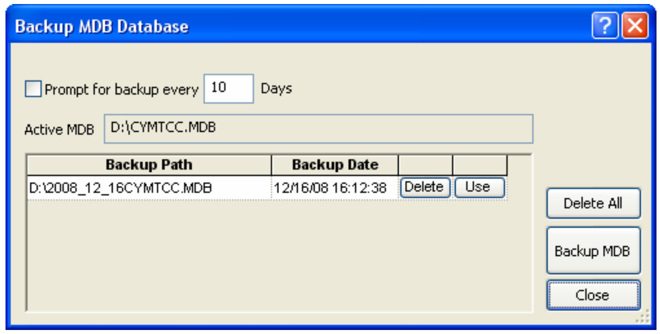


How does it work?

1. Browse for your **DBF Library Path**.
2. Browse for your **MDB Database Path**.
3. Select the device(s) to convert; you can also use the **Select All** button.
4. Click the **Convert** button.

13.8 MDB Backup Manager

This option allows you make a backup of your active database file. You can also make CYMTCC prompt you at regular intervals to perform it.

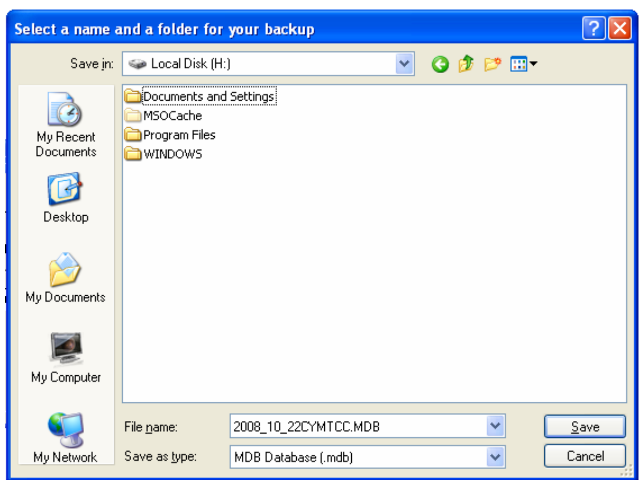


To enable the prompt option check the box and enter the interval you want CYMTCC to ask you if you want to perform a backup. The prompt occurs at the program startup, when the number of days past since the last prompt is greater or equal to the number of days specified.

> **Note**: The backup will not be done automatically; You have to go to the Backup MDB database options. Click the button in the message window to open the dialog box.

To make a backup, click on the **Backup MDB** button. A **Save as** dialog box will open. Select the folder and the file name you would like to use and click **Save** to perform the operation.

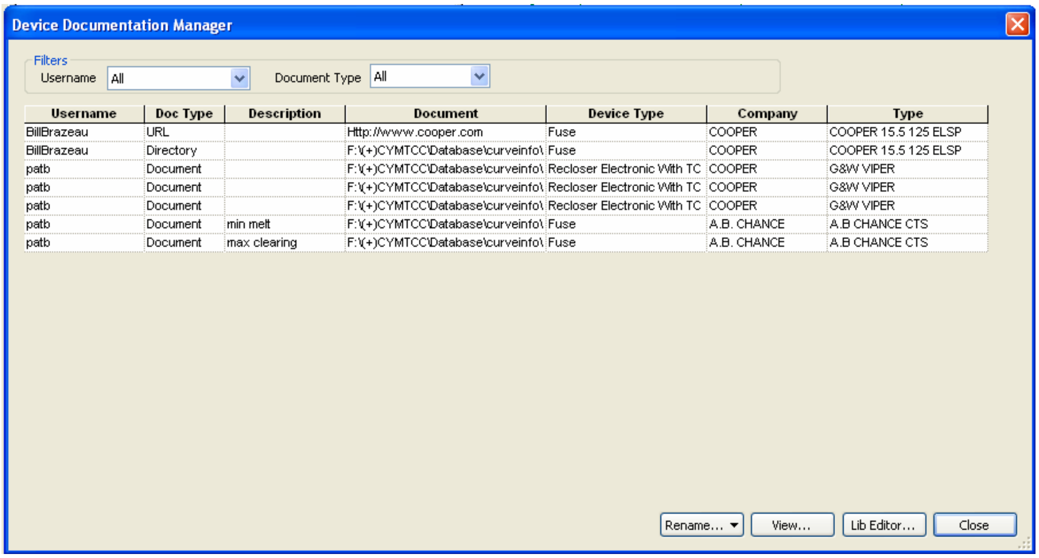
> **Note**: The default file name will be the date of the day followed by the actual database file name.



A list displaying all the backups performed is there for information purposes. To remove an entry from the list, click the **Delete** button of the actual line. To completely clear the list, click the **Delete all** button. Click the **Use** button to change the active database to the one listed on the line the button was clicked.

13.9 Device Documentation Manager

The **Device Document Manager** option allows you to manage your documents stored in your database. When using this tool, you will see all the documents available for all the devices, along with the type of document, the user who added it and the device company and type it is attached to.

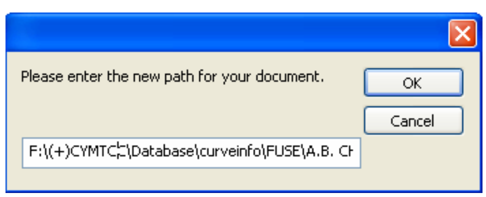


You have the possibility to filter the list by user name or by document type.

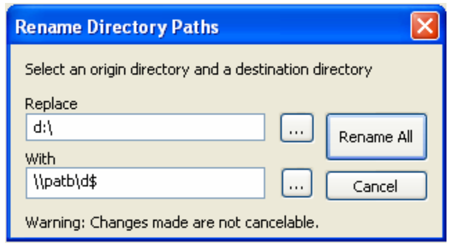
The **Verify** option will make sure that the folders and file paths are valid. If an invalid entry is found, the document field will have a red background.

The **Rename** option allows you to change the document path of the selected item (line) or all the item currently listed.

The **Rename Selection** command will open a dialog box where the path is displayed in an edit box. Make your modification a click **OK** to validate.



The **Rename All Filtered** option opens a dialog box where you have to enter the text you would like to replace and the text you would like to replace it with. Click **Rename All** to perform the modifications.



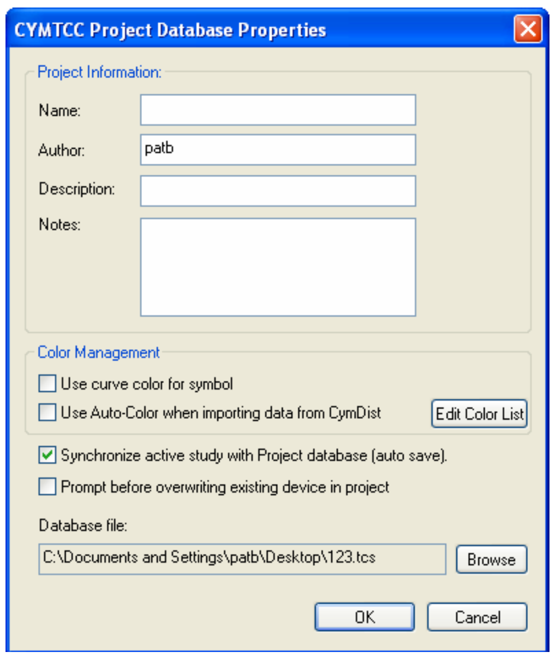
The **Lib Editor** option will open the **Library Editor** on the selected type (line) at the documentation tab so you can make a modification if necessary.

The **View** option will open the document of the selected line.

13.10 Settings Database Manager(TCS)

Opens the **CYMTCC Project Database Properties** dialog box of the current active project, if there is one, otherwise you can browse for an existing TCS file or create a new one.

See **Multi-Explorer > Settings Tab** for more information (section 16.3).



Chapter 14 The Window Menu

14.1 Overview of the Window Menu

These commands allow you to arrange the study windows automatically. You may also move, close, maximize and minimize the windows just as in any other Windows program.

A list of opened windows appears at the bottom of the Windows menu. A check mark identifies the active window.

14.2 New Window

Opens another window on the active study, allowing you to have an alternate view of it. For example, use the second view to maintain a zoomed-out view while you work on a zoomed-in view of the same study in the other window. The title bar of the window includes the number of the window (1, 2, etc.) when there is more than one.

14.3 Cascade

Makes all open windows overlap, showing only the title bar of each.

14.4 Tile Horizontal

Displays all opened windows from top to bottom, occupying all the available screen space, and assigning to each window an equal area. The active window will be uppermost.

14.5 Tile Vertically

Displays all opened windows from left to right, occupying all the available screen space, and assigning to each window an equal area. The active window will be left-most.

14.6 Arrange Icons

Aligns the icons representing minimized windows along the bottom of the screen.

14.7 Window List

Lists the currently opened windows. You may make any one the active window by selecting its name in this list.

Chapter 15 The Help Menu

15.1 CYMTCC Contents

Displays the Users and Reference manual in the form of an index of subjects and key words about which you may display information.

15.2 Readme.htm

Displays the readme file into your web browser. The readme file normally contains:

- A list with short description of the new features, fixes and enhancements since the last release.
- A short description of the installation procedures and platform requirements relevant to the current release.
- A history of the most recent versions.
- CYME contact information.

15.3 What's new (Part1 and Part2)

Opens a PDF file showing the modifications and improvement made to CYMTCC 5.

Note that some of the dialog boxes in part 1 have been modified.

For more information on a specific option, remember that you can always use the Help function by clicking the Question mark icon located on the caption bar of every dialog box.

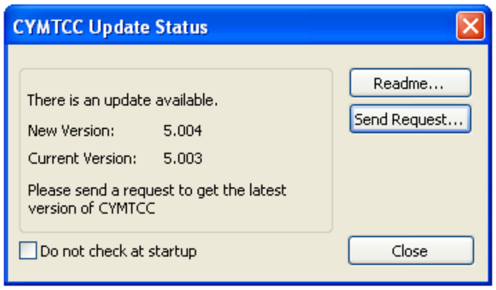
15.4 Protection Key

Will open the **HASP Admin Control Center** program. See the Protection key setup User Guide for more information.

15.5 Check for Updates

This option will let you know if a new version is available to download. The verification is automatically done at program startup unless specified otherwise.

Note:	This option only works when you have a working Internet connection. It might also not work if some special settings are required to connect to the Internet such as a proxy server or a proxy firewall.



When a newer version is available, a message invites you to send a request to obtain information on how to get it.

When the **Send Request** button is clicked, your default email program should open with the email address and subject already filled in. Complete the body text as indicated and send the email. We will send you the information requested as soon as possible.

If your email program is not opening or you don't have any email program installed on your computer, please send us an email, fax or call us through the regular channel.

When the **Readme** button is clicked, the latest version of the read me file will open in your default web browser.

Check the **Do not check at start up** box to prevent CYMTCC to verify if a new version is available.

15.6 Video Help

In order to show you how to perform some of the more complex functions, we are now including a menu option that provides some animated demos. More subjects will be added with the next releases.

Note:	A download manager will be available soon.

15.7 On-Line Help

Will open your Internet Browser to a page where it is possible for the technical support person to view your computer screen or for you to see the screen of the technical support person.

15.8 Discussion Forum

To better communicate with its users, CYME has created a discussion forum, where the users have access to the latest news regarding the software you're using like: New release, known bugs and exchange with us and with other users. You will have the possibility to Subscribe to a discussion group to receive an email as soon as a new message is posted.

15.9 CYME on the Web

To get directly to the main page of the CYME web site. From there, you can go to the **Download** section to get the most recent version of our software and much more.

15.10 About CYMTCC

Displays the version number, revision number within that version and the date of the revision. This is helpful information to include in any communication with CYME.

Chapter 16 The Multi-Explorer

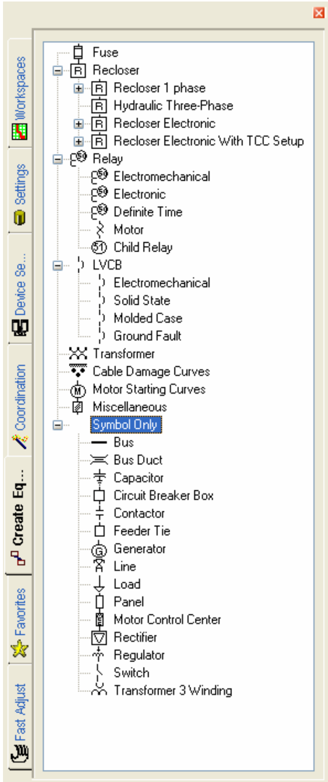
16.1 Overview

The Multi-Explorer pane can be activated or hidden by using the menu command **View** > **Multi-Explorer** or the corresponding toolbar icon .

It comprises seven tabs:

- The **Workspace Tab**: To view all your workspace and studies included in them (see 16.2).
- The **Settings Tab**: to access the settings files (see 16.3).
- The **Device Search Tab**: to access the window for searching devices in the database (see 16.4).
- The **Coordination Tab**: to access the coordination options (see 16.5).
- The **Create Equipment Tab**: to access the create equipment option (see 16.6).
- The **Favorites Tab**: to create a list of the devices you most often use, and share it (see 16.7).
- The **Fast Adjust Tab**: to adjust the settings of the selected device without having to open its dialog box. (see 16.8)

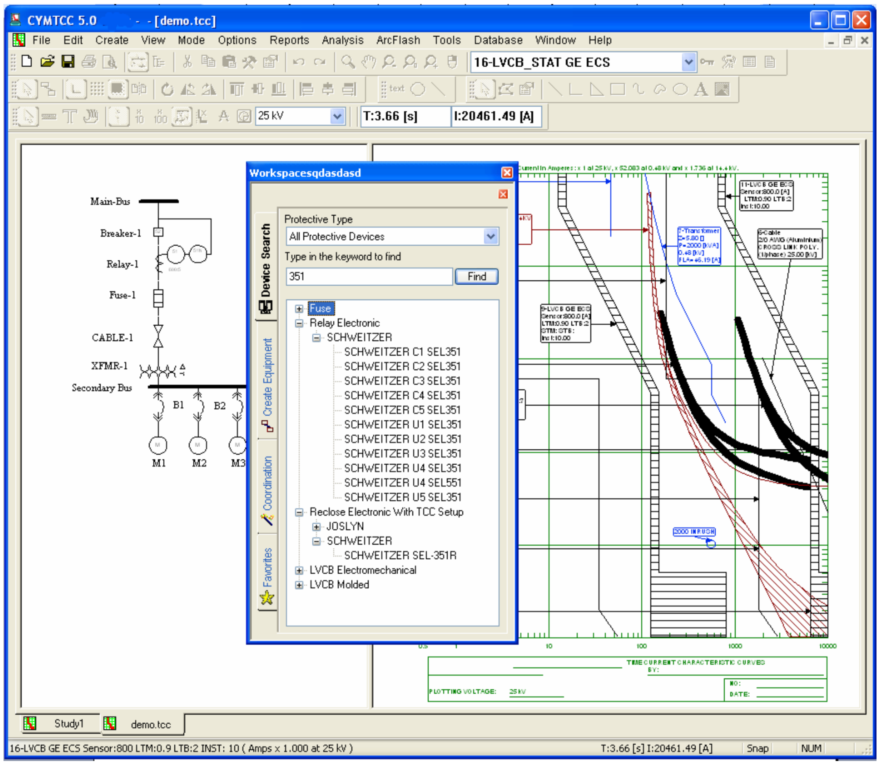
Associated functionality is described below.



16.1.1 Dock Windows

You can dock the Multi-Explorer on both sides of the application. It is also possible to keep it floatable.

Click on the top of the Multi-Explorer window and hold the mouse button down; move the window to its new location.

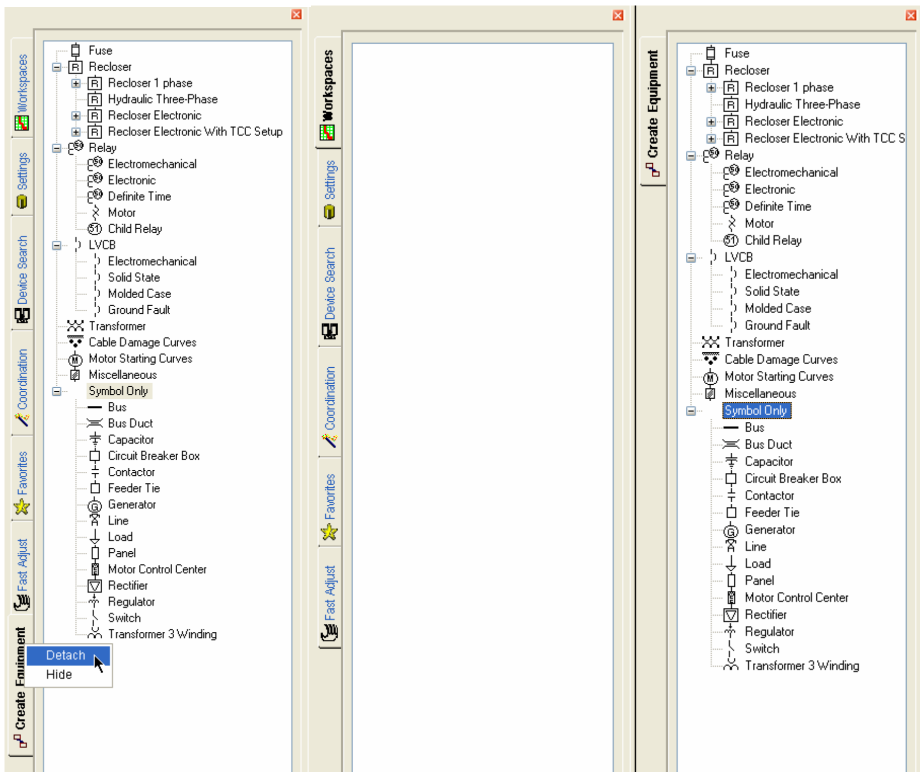


16.1.2 Detach Tabs / Create New Multi-explorer Windows

This option allows you to remove a tab from the Multi-Explorer so it can be in a new Multi-Explorer window by itself.

To do so, right click on the tab to detach and select detach from the popup menu. A new Multi-Explorer window will be created with the selected tab in it.

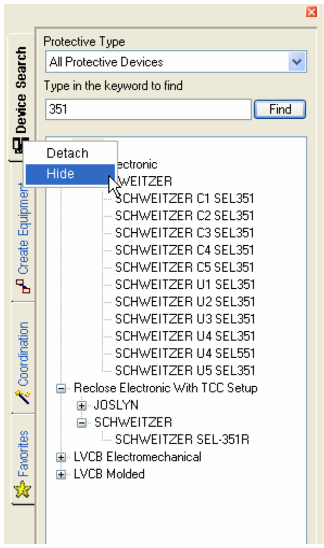
If you would like to transfer tabs from one multi-explorer to the other, simply drag and drop the tabs.

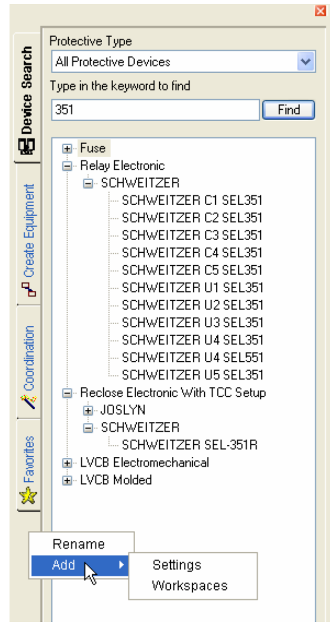


16.1.3 Hide Tabs

Right click on the tab you would like to remove and select **Hide** (image on the left) from the popup menu.

To put it back, simply right click in the tab area, below the last tab, and select the tab from the **add** (image on the right) sub menu.



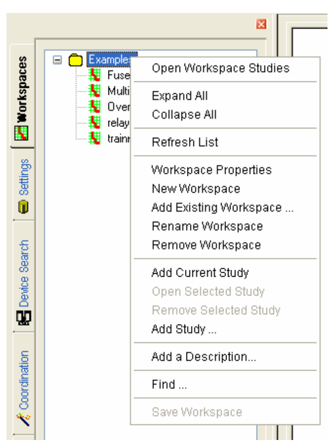


16.2 Workspace Tab

This option allows you to store many studies under one group.

This is where all your workspaces will be listed. Each workspace can contain "*n*" studies.

When right-clicking in the workspace area of the Multi-Explorer, you will see a popup menu showing different options. Those options can be enabled or disabled depending on if you have clicked on the Workspace name or a Study name.

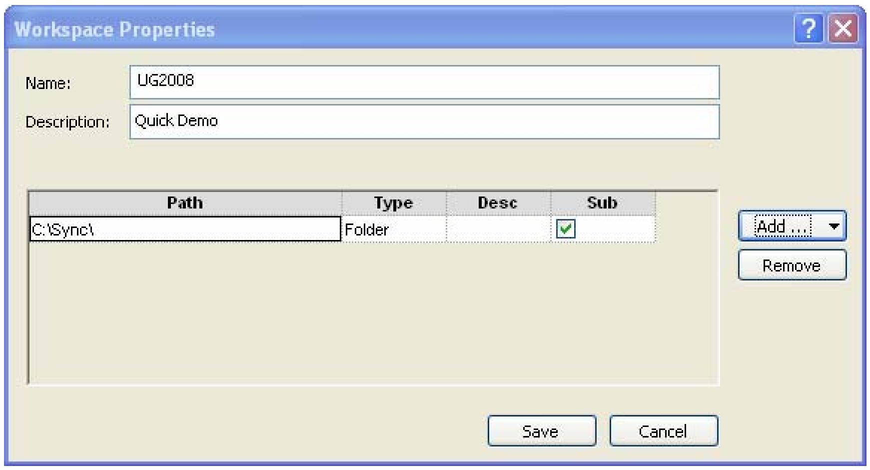


Open workspace studies	To open all the studies of the selected workspace.
Expand All/Collapse All	To expand or collapse the tree structure.
Refresh List	To refresh list of workspaces.
Properties	Opens the same dialog box than the **File > Create Workspace** command with all the studies listed.
New	Opens the **Create Workspace** dialog box without any study listed (see 16.2.1).
Add Existing	If you have removed a workspace you can put it back.
Rename	To change the name of the selected workspace by using the **Rename** dialog box that opens.
Remove	To remove the entry from the list. The workspace project file will not be deleted.
Add current study	To add the current study to the selected workspace.
Open selected study	Opens the study that you right clicked on.
Remove selected study	Removes the study you right clicked on from the list. The study will not be deleted.
Add study…	Opens the **Open** dialog box so you can browse for a study that is not opened in order to add it to the selected workspace.
Add a description to a study	When the study name is highlighted, the description is visible at the bottom of the workspace list and in the tooltip when the mouse cursor is placed over the study name.
Find	Use the **Find** option if you can't locate a study. The description field is also included in the search criteria.
Save workspace tab	The **Save workspace tab** option should be used if you have added a description or if you have renamed a workspace. If you close the Multi-Explorer or exit the application without doing so, the software will display a prompt asking you if you wish to save your changes.

16.2.1 Create Workspace

Use the **Create Workspace** command, from the file menu, when you want to create a new workspace. You can also right click in the Multi-Explorer window and select **Create workspace** from the popup menu.

Note: This window will also open if you right click on a workspace in the multi-explorer and you select workspace properties from the popup menu.



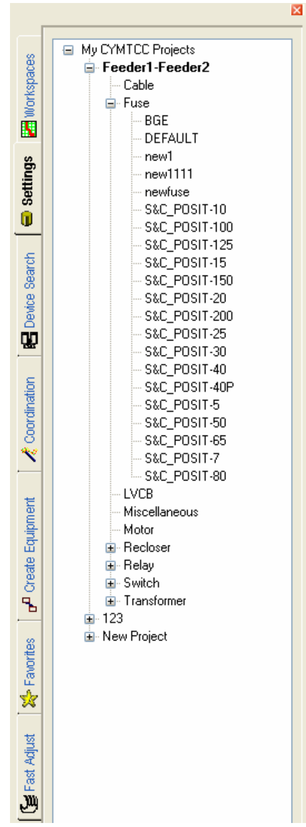
1. You need to specify a name for your workspace.
2. You can also add a comment (**Description**).
3. Click the **Add** button and select from the drop down list what you want to add:
   - **Studies**: Browse to select studies.
   - **Opened studies**: Select from the current opened studies.
   - **Folder**: Select a folder containing study(ies) file(s). If you want to include all the sub folders, check the **Sub** box from the list of Studies/Folders.
4. When you are done, click the **Save** button to specify the location of your workspace file. (.tccws)
   - The **workspace** will be automatically added to the Multi-Explorer Workspaces tab. You might have to refresh the list to make it visible. You can do that by clicking the tab key and pressing the F5 key.

16.3 Settings Tab

Also called the Project window, the database of your project is displayed here in a tree structure, which branches can be expanded or collapsed.

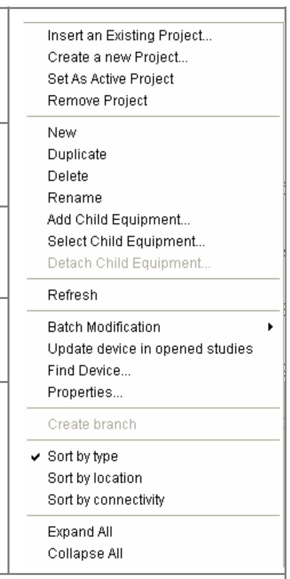
It is primarily used when importing network circuits from the CYMDIST and PSAF programs. It can also be used to create pre-defined settings of a particular device or a sub database.

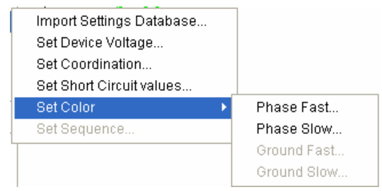
Each databse is contained in a file called “SettingsDatabase.tcs” by default, but you can rename that file as long as it has the .TCS extension.



You have access to a shortcut menu when you right-click in the window for further functions:

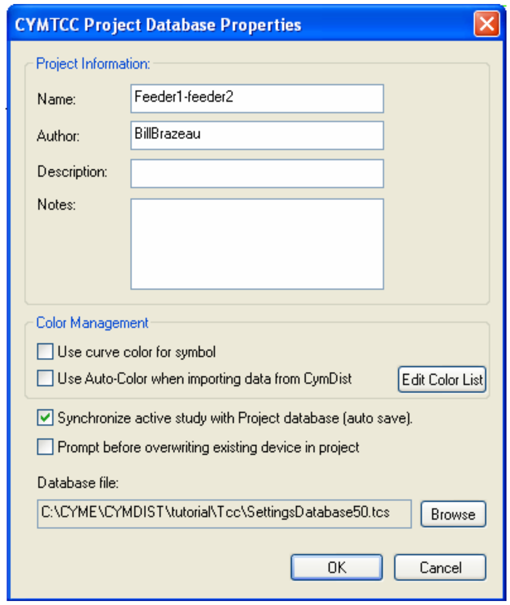
Insert an Existing Project…	Allows you to add an existing project to the **Settings** windows.
Create a new Project…	Allows you to add a new project to the **Settings** windows.
Set as Active Project…	To activate the selected project. **Note**: Only one project at a time can be active.
Remove Project	Removes the selected project from the **Settings** window.
New	Creates a new device, and opens the corresponding **Device Settings** dialog box.
Duplicate	Creates a new device as a copy of the selected device.



Delete	To remove a setting from the list.
Rename	Lets you change the **Device ID** (see 5.3.2).
Add Child Equipment…	Lets you creates a new child relays (Multi-Relay) Only available when a relay is selected.
Select Child Equipment	Opens a dialog box from where you can select existing orphan relay and add it as child relay of the selected one (Parent).
Detach child Equipment	This option is only enabled when clicking on a child relay. It changes the state of the relay from a child to an orphan.
Refresh	To update the list displayed with the information contained in the database of settings.
Batch Change	To change different options (See image on the right) for all the settings or for the settings of a specific device type (depending on the level of the tree view the option was called from). 
Import Database	Lets you select another TCS file to import the settings from. If the settings already exist, you will be prompted to overwrite.
Set Device Voltage	Set the devices “Device Voltage” to the new value entered.
Set Coordination	Allows you to modify the coordination.
Set Short Circuit Values	Allows you to modify the Short Circuit option.
Set Color	Allows you to modify the curve color. Depending on the level or the device type, the sub menu listing the curve type will change.
Find Device…	To find a particular setting using its full name or a string.
Properties	If you were positioned on the ID name of a device when you right-clicked, **Properties** will allow you to modify or inspect the settings of the selected device (see descriptions in Chapter 5 The Create Menu).

<u>Note</u>: Even if the **Auto-save** option in the project properties is not checked, the modifications to the device will be saved.

Also, if you position your mouse on the <u>name of a project</u> in the tree list, then, selecting properties in the contextual menu will display the **CYMTCC Project Database Properties** dialog box.



Project Information

The fields in this group box are for information purposes only. The **Name** field will be appearing in the Multi-Explorer.

Color Management

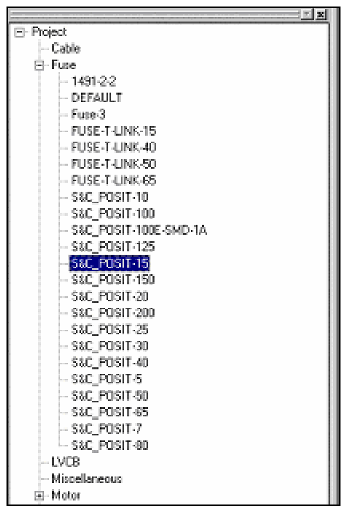
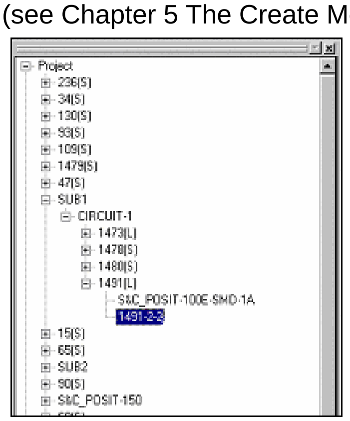
- <u>Use Curve color for symbol:</u> When the devices are received from PSAF or CYMDIST, the symbol color will be the same as its curve.
- <u>Use auto-color when importing data from CYMDIST:</u> When the devices are received from PSAF or CYMDIST, the curves color will be generated using the Color List.
- <u>Edit Color List:</u> Opens the option that lets you choose the colors to create the list that will be used when the auto-color is enabled.

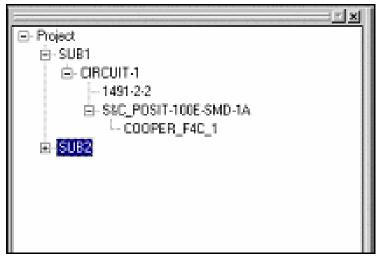
Auto Save Flag

- <u>Synchronize active study with project database (Auto save):</u> When checked, any modification done to the device in a study, that has an ID, will be the same in the project database file.
- <u>Prompt before overwriting existing device in project:</u> When checked and with the auto-save option also checked, if you modify a device with an ID, a warning box will ask you if you want to save the changes.

Database File

- In the dialog box that opens, you may specify which database to use.

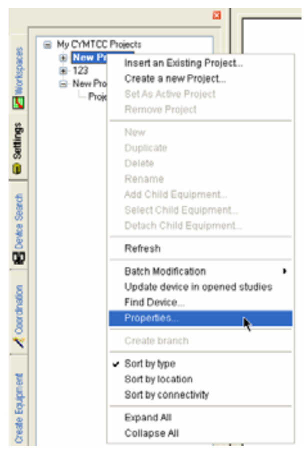
Create branch	Allows you to create instantly a study featuring all protection devices between the source (Highest level of the selected branch) and the selected device. It is available only if you have used **Sort by Connectivity**. The device symbols will appear in the One Line and their curves in the curve plot.
Network analysis…	Network Analysis performs Coordination, Loading and/or Reach analysis on the branch consisting of all devices from the source down to the selected device. It does not change the existing One Line at all. See **Analysis > Protective Device Analysis** (Section 10.1). This command is available only if you have used **Sort by Connectivity** (see below).
Sort by type	Displays by categories all devices in the network by their type (fuses, relays, etc.) This setting makes it easy to create studies by clicking and dragging individual devices from the Project window into the One Line Window. 
Sort by location	Displays in alphabetical order the location of the devices in the network. These locations are the **Section ID** names from CYMDIST and **Branch ID** names from PSAF. You may expand the list to inspect the device at each location, by clicking on the + sign. This mode requires that you identify the Location of the device in the **Device Settings** dialog box (see Chapter 5 The Create Menu). 

Sort by connectivity	Displays the circuit in a tree structure, so that you may see which devices are upstream or downstream from others. This mode requires that you identify the Parent Equipment ID (the name of the device upstream from each device). (see Chapter 5 The Create Menu). 
Expand All	To display all subfolders, and all entries in subfolders, under the selected folder.
Collapse All	To collapse all subfolders under the selected folder.

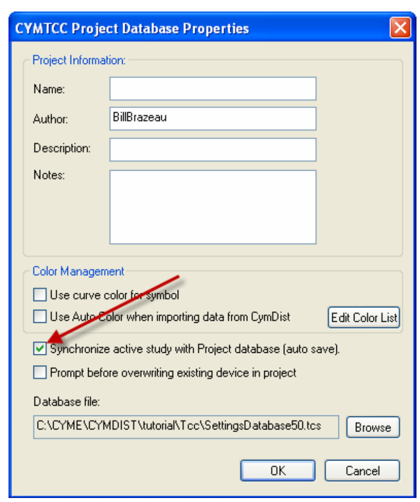
16.3.1 Add a Device from an Existing Study

You can add devices that you already have in existing studies.

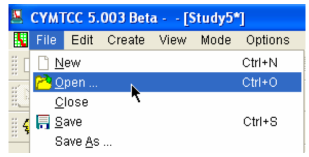
1. Go to the **CYMTCC Project Database Properties** dialog box.



2. Check the **Auto-Save** option.



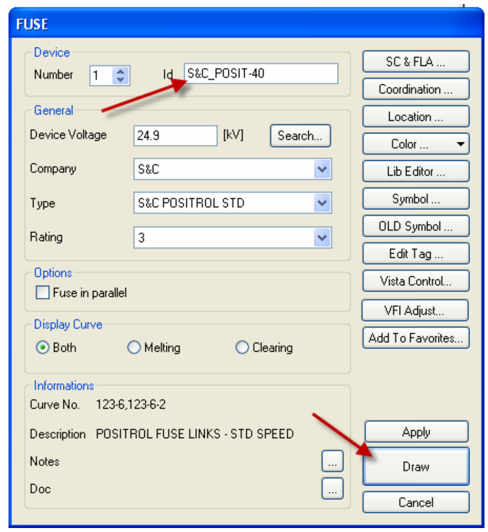
3. Open your study.



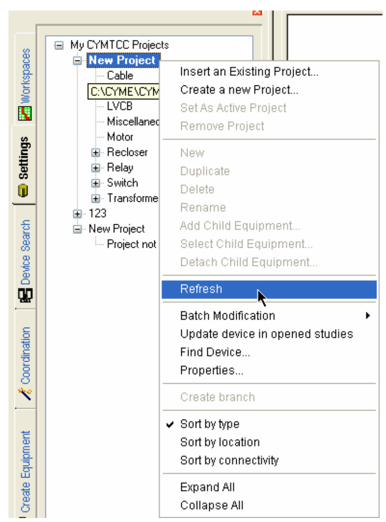
4. Open the **Device Properties** dialog box of the device you would like to add.

5. Enter an **ID**.

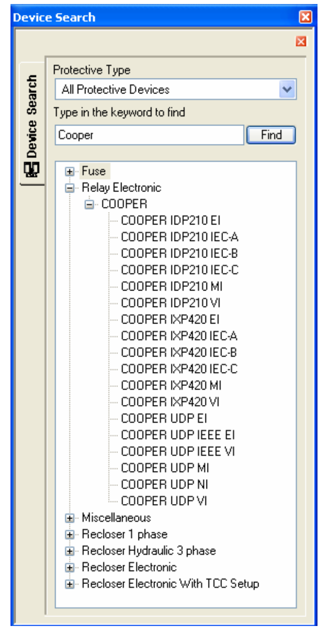
6. Click **Draw** to close the dialog box.



7. Refresh the settings list of the Multi-Explorer.



16.4 Device Search Tab



The associated window provides the means to search for a device through the database using a sub-string. (This is an easy way to find a particular device when you have only the curve number information for example.)

Type in your keyword and click **Find** or press the **Enter** key to get the result. If the search yielded no result, an error message will be displayed.

If you are looking for a particular type of devices, select it from the Protective Types combo box. You also have the possibility to search for Fuse rating, a specific value included within a formula used by CYMTCC to generate the curves or want to search through devices that were modified by users.

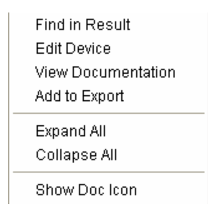
The results of the search result are grouped by device type and company.

When you position the mouse cursor over a device in the list, information about it is displayed in a tooltip. (Company, Type, Curve number and Description).

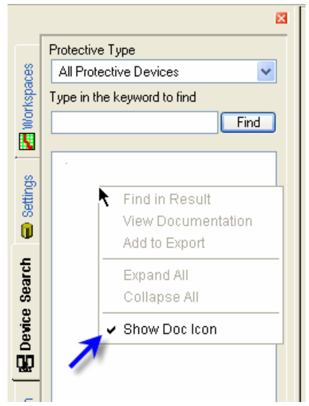
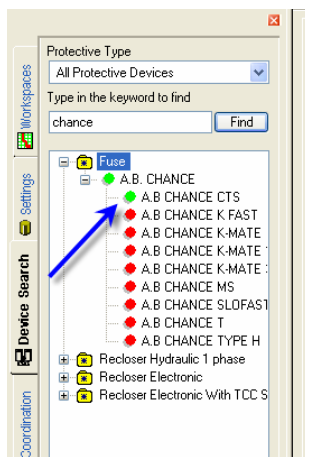
Enter ***** in the Find field to display all available devices based on your protective type selection included in the active database of CYMTCC. (This is not a search operation.)

To insert a device selected in this window into the active study, drag and drop the device onto the One Line Diagram or double click on its name to insert it at the top of the diagram.

When you right click on an item in the result window you get this popup menu.



Find in Result	Allows you to search within your search result.
Edit Device	Will open the **Library Editor** dialog box (see 13.3) with the selected item.
View Documentation	Opens the **Library Editor** dialog box at the **Document** tab for the selected device.
Add to Export	Adds the item to a list the can be exported using the Export option. (see 13.5.2)
Expand All/ Collapse All	Expands or collapses the tree structure.

Show Doc Icon	When you use the **Search** option, you can see if there are Documents available for the devices listed in the **Search result** box. Make sure that that the **Show Doc** icon option is selected in the popup menu. If this option is not checked, the Result box will not show the colored dots indicating the presence of document(s).  A green dot specifies that documentation is available for the device. You can go directly to the documentation option by right clicking on the device name and selecting the **View Documentation** option from the popup menu. A red dot means that there are no documents available for that item. 

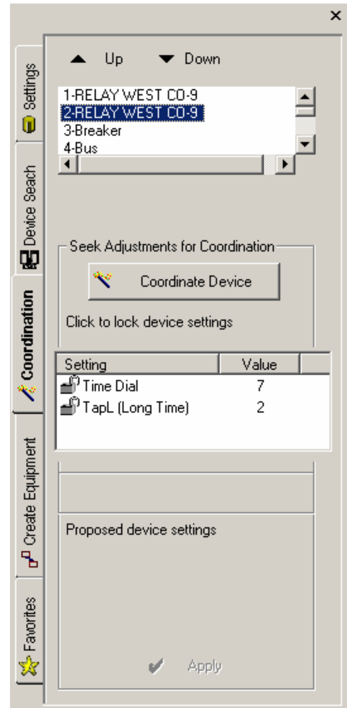
16.5 Coordination Tab

The top part of the Coordination Tab window shows the devices listed in the order they were drawn.

To renumber the devices in the order they are actually connected, highlight a device and click the **Up** or **Down** arrow until it is in the position wanted.

Note: It is very important to have the devices listed in the order of their connection to one another when you do a coordination analysis.

When you double-click on the name of a device in the list, its corresponding **Device Settings** dialog box will be displayed.



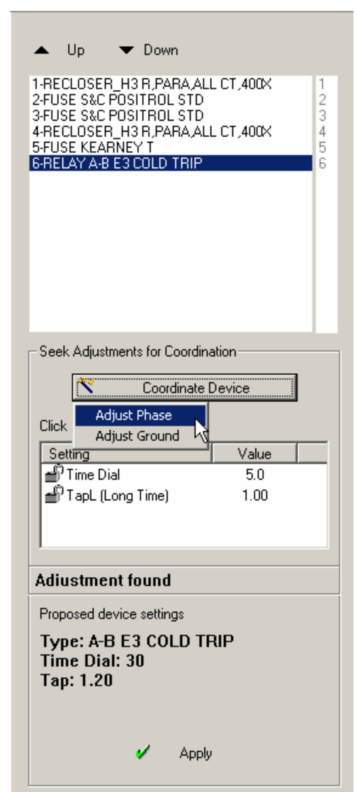
The bottom part of the Coordination Tab window comprises the **Coordination Wizard**.

The Wizard window lists all the available devices in the active TCC study. For each device, its modifiable settings are displayed. It is also possible to prevent one or more settings of a protective device to be adjusted by the Wizard by clicking on the lock icon next to the setting.

The module proposes settings for one or many protective devices of the given circuit. The proposed settings ensure that the protective device are coordinated i.e. that the device nearest to the fault will operate before its upstream device can function.

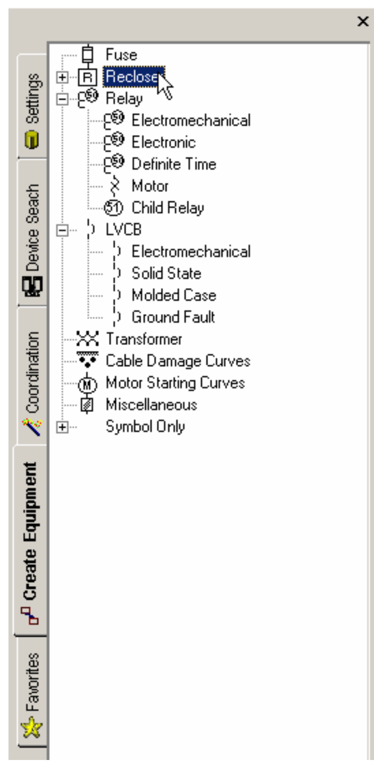
This tool also ensures that the proposed protective device settings will prevent damage to apparatus to be protected (such as transformer, cable and motor) in your circuit.

Alternately, you can right-click on the name of the device in the list of devices above, which will display the adjustment option(s) available for that device.



1. Make sure you have your device in the proper order. The devices in your circuit must be numbered in order, starting with the downstream device and progressing upstream. Use the **Up** and **Down** arrows to renumber the devices.
2. Select the device to adjust.
3. It is possible to prevent one or more settings of a protective device to be adjusted by the procedure. Click on the **Lock** icon next to the setting to lock it.
4. Click on the **Coordinate Device** button and select **Adjust Phase** or **Adjust Ground** from the menu in order to start the automatic adjustment operation. The program will search for the best adjustment possible. The search is based on the criteria that you entered in the **Device Coordination Criteria** dialog box for the protective device pairs and on the Protection criteria for the devices to protect (i.e. transformer, cable, generator or cable) (see 10.4).
5. The proposed device settings are displayed in bold when an adjustment respecting your criteria is found.
6. Click **Apply** to adjust the device curve to reflect the proposed settings. The Curve Plot window will be refreshed.

16.6 Create Equipment Tab



The list of devices available will be displayed in a tree-like fashion based on the device type. Double click on a device category to expand or collapse it.

You can drag and drop devices from this list onto your one-line diagram, or double-click on the name to insert it. Once the device is "dropped" onto the drawing, its corresponding equipment dialog box will be displayed to adjust its settings.

The Create Equipment Tab comprises the same device definition capabilities than what is available in the **Create** menu (Chapter 5 The Create Menu). See that section for further details on the functionality.

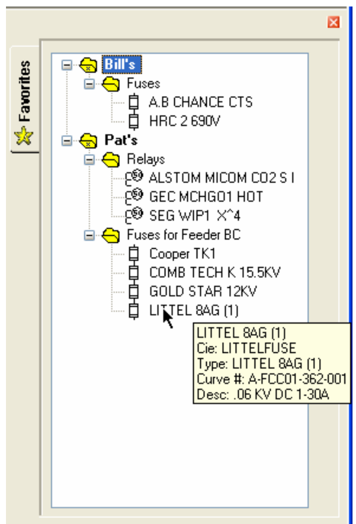
Note: You cannot insert a device category (Recloser, Relay, LVCB, Symbol Only) or the Multi-Relay.

16.7 Favorites Tab

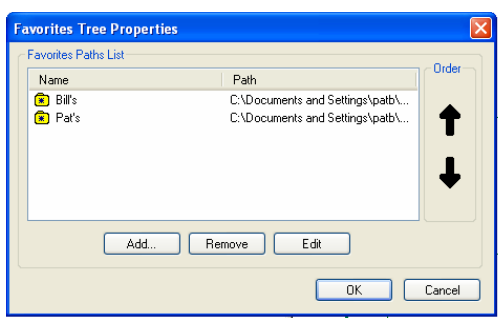
With the functionality available under the Favorites Tab, you can keep a list of the devices you most often use.

Note:	Only the device type, company, type and coordination factor will be saved. For the fuses, the rating and the fuse in parallel will also be saved. To keep a list of devices that include all the settings, use the Settings option also located in the Multi-Explorer.

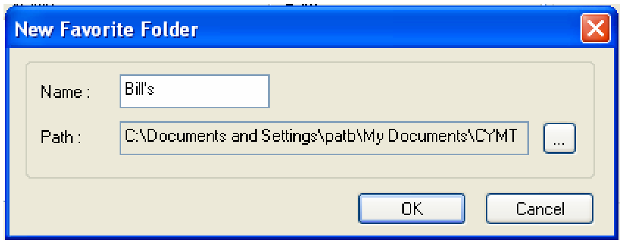
16.7.1 Set up the Favorites



The first time you will start CYMTCC, the favorites list will be empty. Right click in the window and select **Properties** from the popup menu.



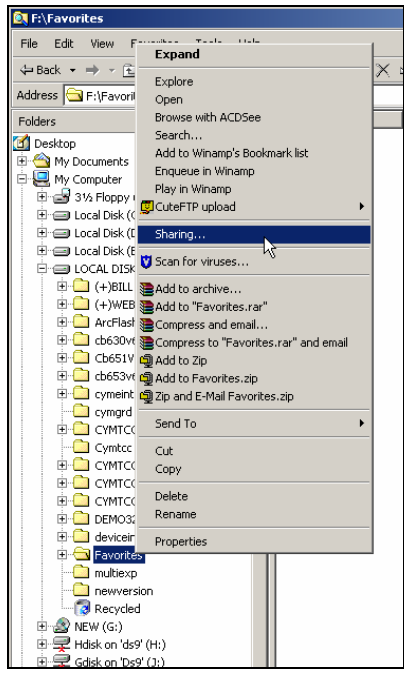
From the **Favorites Tree Properties** dialog box click the **Add** button. Enter the name to give to the favorite "node" and click  to set the destination folder where to keep your favorites.



The current What's new (Part1 and Part2) (see 15.3) comprises a file showing how to use the favorites.

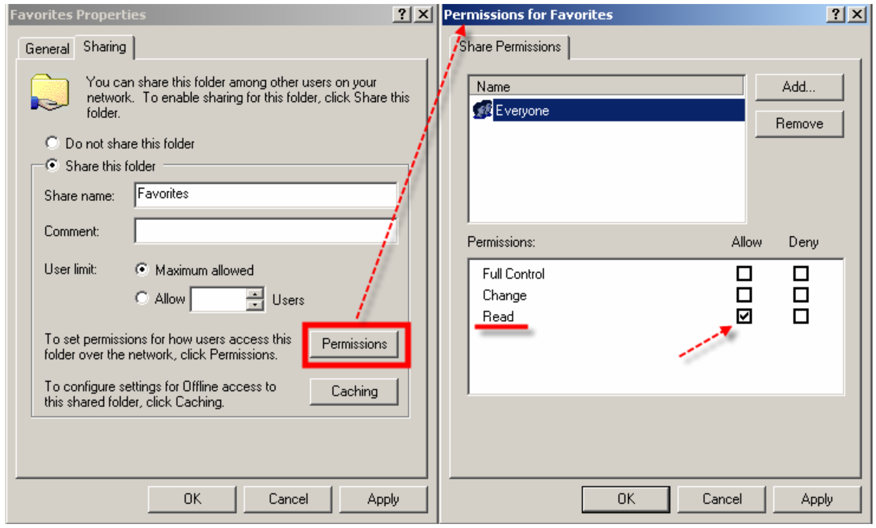
16.7.1.1 Share your Favorites

It is possible to share your favorites with other users over the network. To do so, open your standard Windows files browser and right click on the name of the favorites folder you want to share and select sharing from the standard popup menu.



This is very useful for a company that has many users. For example, all the users can share a favorite folder set on the server containing a list of the most common devices and create themselves a personal list locally on there computer. The list on the server can be managed (add/delete) by only one user, and all the others will only have the possibility to insert the device from the list.

All the management for sharing the permissions is handled by Windows. The **Sharing Permissions** dialog box can be different from the one shown below. It depends on your Windows version.



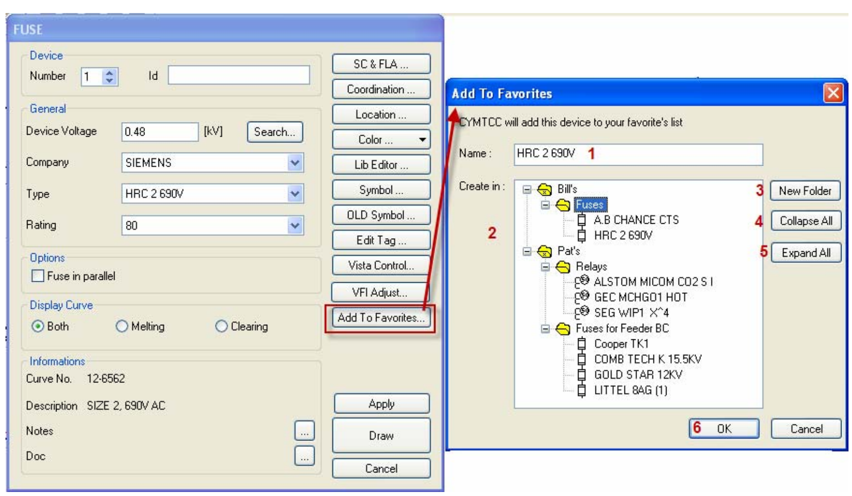
When you are sharing your favorites with other users, make sure that you set the sharing permissions only to **Read** (see above). If you do not, anybody will be able to modify your list.

16.7.1.2 Add Devices to your Favorites List

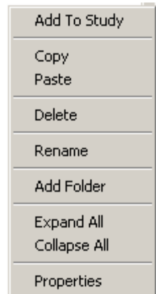
In each **Create** dialog box, an **Add to Favorites** button is available so you can add a device to the favorites list.

When you click the button, a new dialog box is displayed.

1. You can change the **Name** (default is type) of the device.
2. Select in the **Create in** box the location of the folder where the device will be added.
3. Create a new folder if needed.
4. Collapse all the branches.
5. Expand all the branches.
6. Click **OK** when done.



16.7.1.3 Manage the Favorites List



Right click in the **Favorite** list to display the pop up menu with the available options to manage the favorites list.

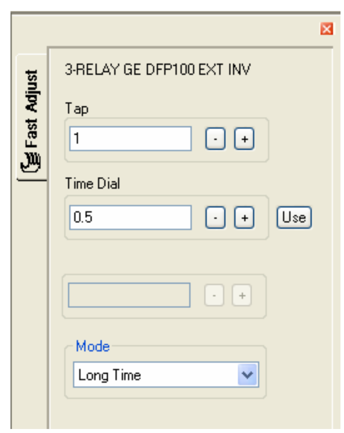
Double click or select **Add to Study** to insert the selected item in your study.

To move items within the list, drag and drop those items inside the list or use the **Copy**, **Paste** or **Delete** options.

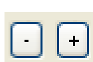
Notes:	When you select an item, you will see a description of it at the bottom of the list. You will also an icon next to the device name that represents its type. If you see a folder Icon with an "**R**" in it, this folder is read only, you will only be able to add to a study or copy items to another folder.

16.8 Fast Adjust Tab

Allows you to adjust your devices, without having to open its **Properties** dialog box, make the changes and click **Draw**.



At the top of the window, you will find the name of the device currently selected. To adjust a different device, select another one.

Use the  button to iterate through the list of available adjustments.

Depending on the type of device selected, the field type will change. There can be up to three different fields by mode.

The mode combo box allows you to select different portions or type of curves of the selected device. For example, with a relay you can adjust the normal curve, the instantaneous and the short time.

For some devices, the  button will be visible. In this case, you can type in a value and click the **Use** button to adjust the device.

Note:	The great advantage of using the **Fast Adjust** mode is that you can see the effect of the adjustments *as you make them*. You don't have to use trial-and-error.

 Puts the cursor into **Fast Adjust** mode. This mode allows you to adjust the settings of a device by moving its curve on the Curve Plot. To do so:

1. Click the left mouse button once on the curve and hold the mouse button down. (The cursor will change to the symbol of a hand, and a dialog box will appear.)
2. Move the mouse. The curve will move with the mouse, jumping from one discrete setting to the next. In this way, you may arrange devices to coordinate by inspection. The settings are recorded by CYMTCC as displayed in the dialog box. See below.
3. Release the mouse button.

You may subsequently inspect and change the settings as usual.

Hint:	The Fast Adjust mode remains active until you choose another mode.

Chapter 17 Library Editor Options

17.1 General Tab

17.1.1 Protective Type

Displays information on the selected device. The same fields are displayed for the protective device types.

Protective Device	The device type name. (Fuse, Relay, Recloser, LVCB, etc.)
Manufacturer	Is the manufacturer's name, for sorting and filter purposes. (Required information)
Type	Is the name that will appear in device lists. Give a unique, meaningful name. (Required information)
Curve Number	Is the number assigned to the curve by the manufacturer. It will be displayed in the device dialog box in CYMTCC, so that you may verify that the correct device curve is in use.
Description	Is a space for a remark concerning the device. The text entered here will be displayed at the bottom of the Device Properties dialog box. (not compulsory)
Creation Date	The date the device was added by CYME.
Modification Date	The last time the device was modified.
Last Modif By	The name of the user who last modified the device. (See **System Tab > Username** at chapter 3.10.1.1).
Notes	See Notes Field at chapter 17.4 (not compulsory)
Hide Warning	See Warning Message at chapter 17.5 (not compulsory).
Warning	See Warning Message in chapter 17.5 (not compulsory).

17.1.2 Characteristics

Displays information on the selected device. Different fields are displayed for each the protective device types.

Fuse	I2T Minimum	not currently used by CYMTCC.
Fuse	I2T Maximum	not currently used by CYMTCC.
Fuse	Category	Select the fuse category. This information is only used for Arc Flash calculations. Select From: None, Expulsion, Current Limiting (Class L or Class RK1)
LVCB Static and Electromechanical	Current Rating	Is the nominal current (in Amperes) of the breaker.
LVCB Static and Electromechanical	Short Time Rating	Is used in calculating the Instantaneous Pick-up current if the HI-RANGE instantaneous option is selected.
LVCB Static and Electromechanical	Voltage Rating	Is given in kV. (For information, not used by CYMTCC.)
LVCB Molded	Adjustable Trip	Indicates whether the adjustable Short Time or Instantaneous option is active (☑) or not (☐).
LVCB Molded	Per Unit	Defines whether the current coordinates in the curve data points are going to be defined in per-unit of the Plug size (☑) or in Amperes (☐).
LVCB Molded	Breaker Frame Size	Is the rated full load current of the breaker, not the Plug.
LVCB Molded	Voltage Rating	Is given in kV. (Information field, not used by CYMTCC.)
LVCB Molded	Band Mode	Defines whether the trip multiplier is applied to the Plug Rating or the Frame Size.
LVCB Ground	Voltage Rating	Is given in kV. (Information field, not used by CYMTCC.)
LVCB Ground	Band Mode	**Follow multiplier:** The time value of the curves will be multiplied by the value selected in the multiplier field of the Device properties dialog box. **Fixed in Time:** The curve will always be drawn at the values entered.
Reclosers	Multiplier	The product of the coil rating or Pickup, and this factor defines the starting point of the device curve.
Reclosers	Response time	Is the delay (in seconds) due to interrupting. The Response curve is the Fast or Slow curve shifted downwards or upward by this time **Note**: Next to the value, it will be indicated if it's adding or subtracting the value.
Reclosers	Number of phase	1 or 3. **Note**: Not available for the 1-phase and the 3-phase hydraulic models.
Reclosers	Range	Click the **…** button to display the **Range Editor** dialog box in which you can enter the coil or pickup value and the sequence reclosing values. (see 17.9)

Reclosers	Recloser Control Type	Click the **…** button to select the control type the device will be listed in. Check the boxes next to the control type and click **OK** when you are done. (See 13.3.1.3 Recloser Control Types for more information on how to add new control types)
Relay Electronic and Electomechanical	Mode	defines how the instantaneous pick-up current is calculated. There are three modes: CT Ratio, CT Ratio x Tap, and Primary Amps.
Relay Electronic	CT Factor	Is a multiplier applied to the C.T. Ratio. It is used with relays whose rated current is different from the rated secondary current of the current transformer (e.g., GEC MIDOS).
Relay Motor	Unit Base	Is either "Actual Amps" or "P.U.".
Relay (all)	Tap Range	Click the **…** button to select the tap range(s) associated with the relay type. **Note**: If none are selected, the full list will be shown in the relay properties dialog box.

17.2 Curve/Rating/Sensor Tab

This tab is divided in three portions:

- On the first line, you can select the curve from a list by clicking the **…** button.
- The second portion contains information related to the selected curves such as Interrupting rating minimum and maximum voltage.
- The third portion, located at the bottom, contain the curve(s) information such as the time/Current points, the Formula or the Calibration point and the Slope of a band.

17.2.1 First Line

All	Rating Name Curve Name Sensor ID	Allow you to select a different curve for the selected type. If more than 1 curve is available, click on the **…** button and select another curve from the list.

17.2.2 Curve Information

Common	Interrupting Rating	is given in kA. (For information, not used by CYMTCC.)
Common	Minimum kV	is given in kV. (For information, not used by CYMTCC.)
Common	Maximum kV	is given in kV. (For information, not used by CYMTCC.)
Common	X/R	(For information, not used by CYMTCC.)
Common	Alias	Information on the name the device was used in the previous version of CYMTCC.
Fuse	Rating Name	Is the name of the rating that will appear in the **Device Properties** dialog box, the tag and the reports.
Fuse	Rating Value	Is the fuse rating in Amperes.

Fuse	LetThru 1 and 2: Avail. RMS	not currently used by CYMTCC
Fuse	LetThru 1 and 2: Peak LetThru	not currently used by CYMTCC
LVCB	Sensor ID	Is the list of sensors. Click the **…** button to display the **Range Editor** dialog box. In it, you have the possibility to enter the sensor values as Continuous or Discrete. For Discrete, enter the sensors separated by a semi colon. For Continuous, enter the minimum, maximum and a step value. (see 17.9)
Relay	Curve Name	Is the name that will appear in the **Properties** dialog box Time Dial field, the tag and the reports. **Note**: When the curve is formula based, the name will be DEFINED_IN_FORMULA and cannot be rename unless the curve definition type is set to Points.
Miscellaneous	Curve Name	Is the name of the rating that will appear in the **Device Properties** dialog box, the tag and the reports.
Reclosers	Curve Name	Is the name of the curve that will appear in the **Device Properties** dialog box, the tag and the reports.
Reclosers	Protection Type	Is to select if the curve will appear in the Phase Fast / Phase slow / Ground Fast / Ground Slow combo box. **Note**: For 1 phase recloser, the selection will be Phase and Ground.

17.2.3 Curve Data

Fuse	Mode		Clearing and Opening **Note**: You can enter only one of the two curves. When you just have the Clearing curve or for an average melting curve for example. If the two curves are used, it will display a curve with a tolerance.
Fuse	Model As		Points. (Cannot be changed)
Fuse	Points		Click the **…** button to enter the Time/Current Points Editor (Model as Points) (see 17.6).
LVCB Electromechanical	Long Time Multiplier	Mode	Sensor: LPTU = Sensor Pick-up: LPTU = Sensor ∗ Long Time Multiplier
		Range	Click the … button to open the **Range Editor** and enter the multiplier values. Those values can be modeled as Continuous or Discrete. (see 17.9)
	Long Time Band	Model As	Formula: See Model as Formula (see 17.7). Points: See Time/Current Points Editor (Model as Points) (see 17.6).
	Short Time Multiplier	Mode	Sensor: SPTU = Sensor ∗ Short Time Multiplier Pick-up: SPTU = LTPU ∗ Short Time Multiplier
		Range	Click the … button to open the **Range Editor** and enter the multiplier values. Those values can be modeled as Continuous or Discrete. (see 17.9)
	Short Time Band		Formula: See Model as Formula (see 17.7). Points: See Time/Current Points Editor (Model as Points) (see 17.6).

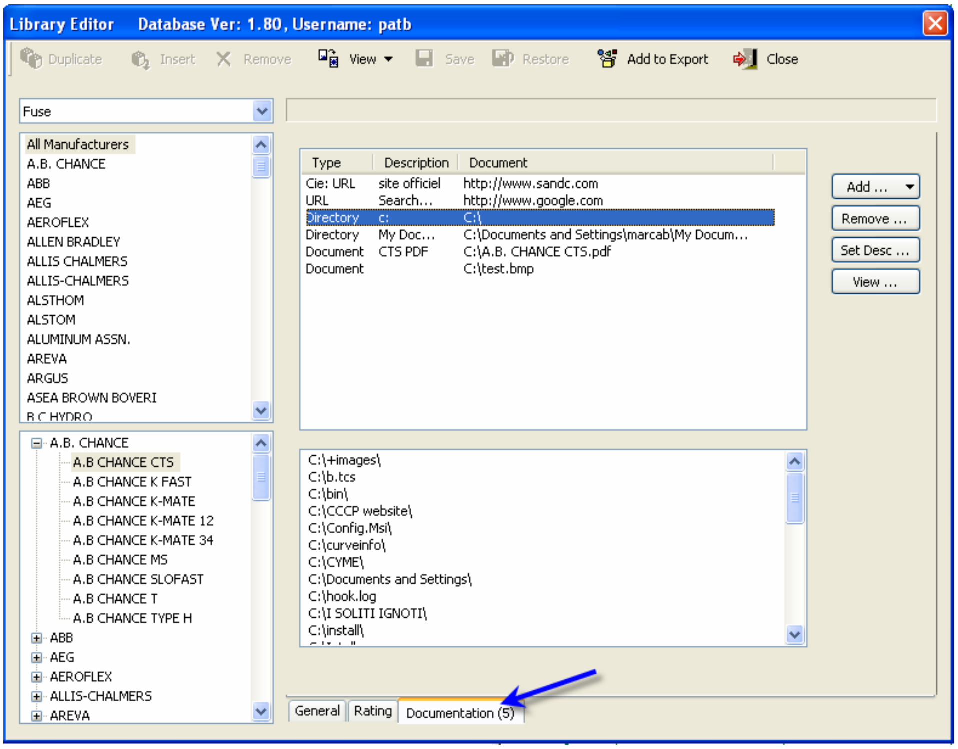
	Instantaneous	Mode	Sensor: Inst.PU = Sensor ∗ Instantaneous Multiplier Pick-up: Inst.PU = LTPU ∗ Instantaneous Multiplier
		Range	Click the … button to open the **Range Editor** and enter the multiplier values. Those values can be modeled as Continuous or Discrete. (see 17.9)
	Override		The override setting is an alternative way to define the Instantaneous Pick-up current. If the option is available, it is associated with either the frame or the sensor.
		Mode	Allows you to choose None, Frame or Sensor. If you choose Frame, give one value (in kA) for the Instantaneous Pick-up current. If you choose Sensor, give one value for each sensor rating available. None deactivates the option.
LVCB Static	Long Time Multiplier Current Settings		Current Settings: Defines the values this additional multiplier may take
		Mode	Sensor: LTPU = Sensor ∗ Long Time Multiplier Current Setting: LTPU = Sensor ∗ Current Setting Multiplier Actual Pick-up: LTPU = Sensor ∗ Current Setting Multiplier ∗ Long Time Multiplier. **<u>Note</u>**: Although you can set the mode for both the Long Time Multiplier and Current Settings, if the long Time multiplier is set to something different than “none”, it will apply the same mode to the current settings.
		Range	See **Range Editor** (see 17.9).
	Long Time Band	Model As	I2T: See Model as I2T (see 17.8). Formula: See Model as Formula (see 17.7). Points: See Time/Current Points Editor (Model as Points) (see 17.6).
	Short Time Multiplier	Mode	Defines the values this multiplier may take. Sensor: STPU = Sensor ∗ Short Time Multiplier Current Setting: STPU = Sensor ∗ Current Setting Multiplier ∗ Short Time Multiplier Actual Pick-up: STPU = LTPU ∗ Short Time Multiplier
		Range	See **Range Editor**. (see 17.9)
	Short Time Band	Model As	Multiplier: Enter values for each horizontal step using the **Range Editor**. (see 17.9) Points: See Time/Current Points Editor (Model as Points) (see 17.6).
	I2T	Model As	I2T: See Model as I2T (see 17.8).
		Mode	Sensor: I = Sensor rating ∗ Calibration Point Current Setting: I = Sensor ∗ Current Setting Multiplier ∗ Calibration Point Actual Pick-up: I = LTPU ∗ Calibration Point

		Type	Fixed in Time: there is only one band. Follow STBthere is one I2T band for each Sh ort Time Band. Follow Inst. the I2T band follows the Instantaneous. Unless you choose "Follow Inst.", you will be asked for the following information.
		Slope Hi	Is the slope of the maximum clearing edge of the band. It is normally equal to -2.
		Slope Low	Is the slope of the minimum clearing edge of the band. It is normally equal to -2.
		Calibration Point	Is that multiple of Long Time Pick-up current at which the time value of each I2T delay band applies exactly.
		Range	Click the **…** button to open the **Range Editor** and enter the multiplier values. Those values can be modeled as Continuous or Discrete. (see 17.9)
	Instantaneous	Mode	Sensor: Inst.PU = Sensor ∗ Instantaneous Multiplier Current Setting: Inst. PU = Sensor ∗ Current Setting Multiplier ∗ Inst. Multiplier Actual Pick-up: Inst.PU = LTPU ∗ Instantaneous Multiplier HI-Range Inst.: Inst.PU = Short Time Rating ∗ Instantaneous Multiplier
		Range	Click the … button to open the **Range Editor** and enter the multiplier values. Those values can be modeled as Continuous or Discrete. (see 17.9)
	OverRide	Mode	The override mode is an alternative way to define the Instantaneous. Frame: give one value (in kA) for the Instantaneous Pick-up current. Sensor: one value for each sensor rating available.
		Range	Click the **…** button to open the **Range Editor** and enter the multiplier values. Those values can be modeled as Continuous or Discrete. (see 17.9)
LVCB Molded	Multiplier	Range	Click the **…** button to open the **Range Editor** and enter the multiplier values. Those values can be modeled as Continuous or Discrete. (see 17.9)
	Long Time Opening Long Time Clearing Short Time Opening Short Time Clearing	Model As	The four curves can only be modeled as Points. But only one long time curve is necessary for the curve to plot on the screen. The Short Time curves are required only when adjustable pickups are used. See Time/Current Points Editor (Model as Points). (see 17.6).
LVCB Ground	Multiplier	Range	Click the **…** button to open the **Range Editor** and enter the multiplier values. Those values can be modeled as Continuous or Discrete. (see 17.9)
	Bands	Model As	Points: Time/Current Points Editor (Model as Points) (see 17.6). I2T: See 17.8 Model as I2T. **Note**: When the Bands are modeled as I2T, you will need to enter long time bands and I2T values. See Below.

	Long Time Band	Range	Click the **…** button to open the **Range Editor** and enter the Long Time band values. Those values can be modeled as Continuous or Discrete. (see 17.9)
	I2T		See 17.8 Model as I2T. **<u>Note</u>**: If no values are entered, the option in the **LVCB properties** dialog box will be grayed out and the band will be horizontal.
Miscellaneous	Mode	Opening and Clearing	You can enter one or both curves.
	Model As	Points	Can not be changed.
	Points		Points: See Time/Current Points Editor (Model as Points) (see 17.6).
Reclosers	Model As	Points Formula	All the reclosers curves can be modeled as points. The TCC setup and Electronic model can also be defined as formulaes. Points: See Time/Current Points Editor (Model as Points) (see 17.6). Formula: See Model as Formula (see 17.7).
		Group	For the Recloser with TCC setup, you can specify the group(s) the curves are in. **<u>Note</u>**: This is not used by all control types. If your control type does not use this feature, just select the number one entry.
Relay Electromechanical	Define Instantaneous	Opening / Clearing	Lower and upper edge of the instantaneous portion of the curve. When used, the vertical portion of the instantaneous will use this data instead. Not all the curves use this functionality. For an example see the General Electric IAC-53 curve.
	Model As	Points	The Electromechanical relay has only one curve and can only be modeled as points. See Time/Current Points Editor (Model as Points) (see 17.6).
Relay Electronic	Model As	Formula Points	The electronic relay curves can be defined as Formula or Points. Click the **…** button to change its model. Formula: See Model as Formula (see 17.7). Points: See Time/Current Points Editor (Model as Points) (see 17.6).
Relay Motor	Mode	Opening / Clearing	You can enter two sets of curves (Opening and Clearing) for the motor relay. You can enter one or the other or both (tolerance).
	Model As	Points	Points: See Time/Current Points Editor (Model as Points) (see 17.6).

17.3 Documentation Tab

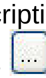
The **Documentation** option allows you to store documents such as PDF files of curves, pictures of the device or a website URL about a specific device.

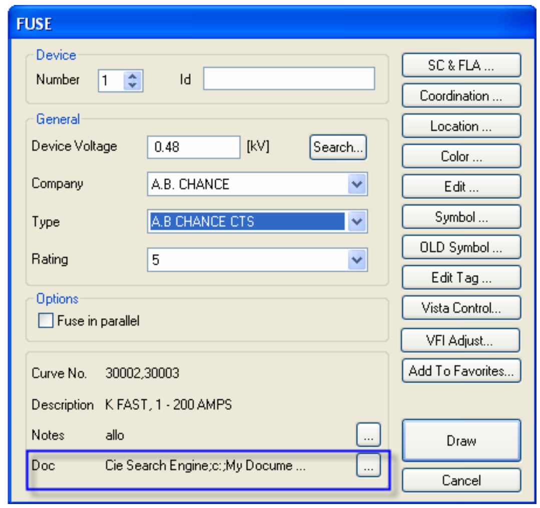


Add	When the **Add** button is clicked, a drop down list will appear. Select the type of document you would like to add to the selected type. Choose from File, Directory of URL. When the selection is made, a new window will appear from which you can selected the file(s), folder or URL.
Remove	Remove the selected document from the list located on the left side.
Set Desc.	The second column of the top pane is the description. Before clicking **Set description** button, select an item from the list. Then enter a brief description of the document. This description will also be shown in the information window of the **Device Properties** dialog box.
View	Select a document from the list and click the **View** button to open the file with the program associated with this type of file.
Top Pan	Shows the type of document, a short description and the full path of the document.

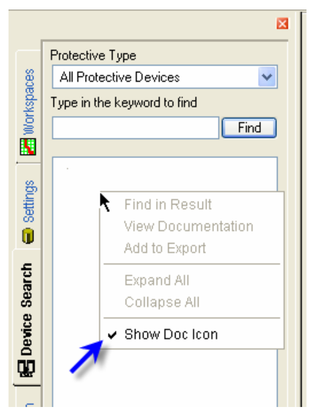
Bottom Pane	The bottom pane will display information about the document selected in the top pane, or show a preview of it. If a folder type document is selected, all the files located in that folder will be display. If a graphic file such as a JPG is selected, the graphic will be displayed. **Note**: Not all the file types can be shown. For example, the URL type will not show a preview.

Document field of the Device Properties dialog box.

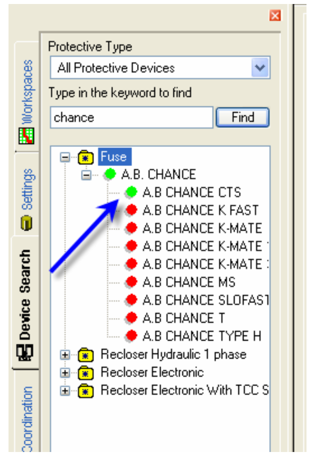
This Documentation (Doc) field is located at the bottom of every Device Properties dialog box. It is showing the description you have entered previously. Clicking the  button will open the Library editor at the Documentation tab.



Furthermore, when you use the Search option, you can see if there are documents available for the devices listed in the Search result box. Make sure that that the Show Doc icon option is selected in the popup menu. If this option is not checked, the Result box will not show the colored dots indicating the presence of document(s).



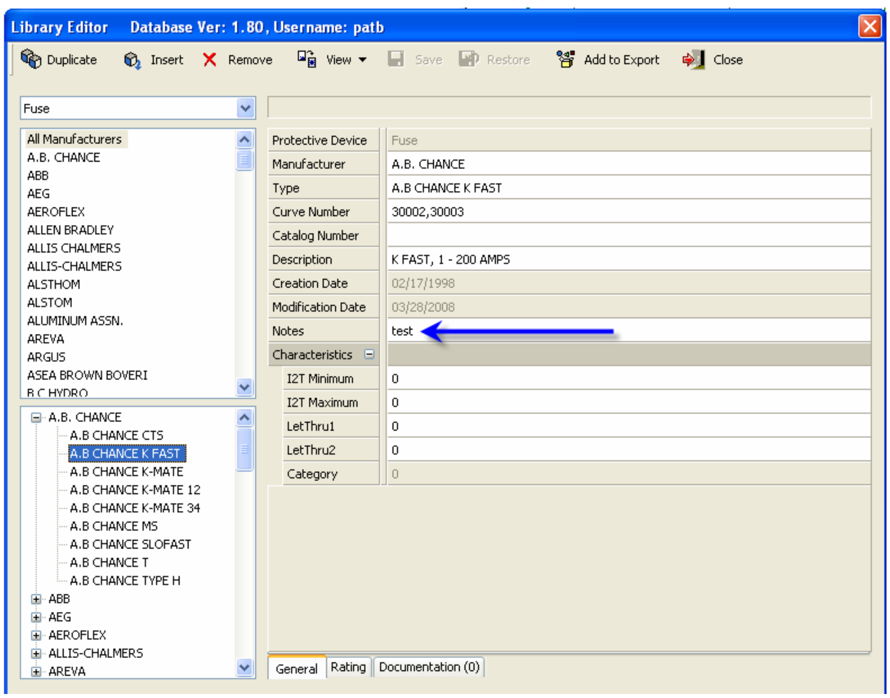
A green dot specifies that documentation is available for the device. You can go directly to the documentation option by right clicking on the device name and selecting the View Documentation option from the popup menu. A red dot means that there is nothing available.



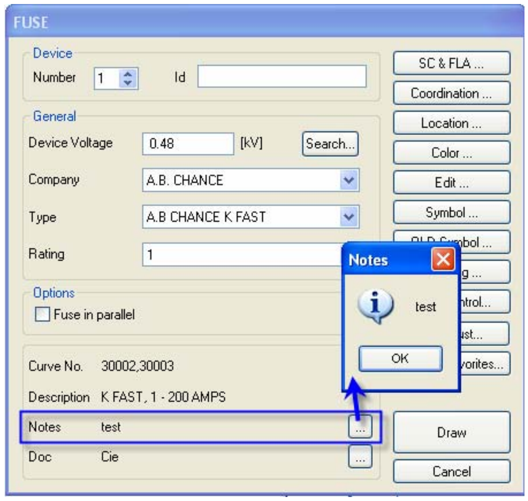
17.4 Notes Field

The **Notes** field allows you to add extra information about a specific device.

For each device you can insert up to 64000 characters!



This field is visible in each device **Properties** dialog boxes. If the note is too long to be completely visible on one line, click the ... button to view it in the text window.



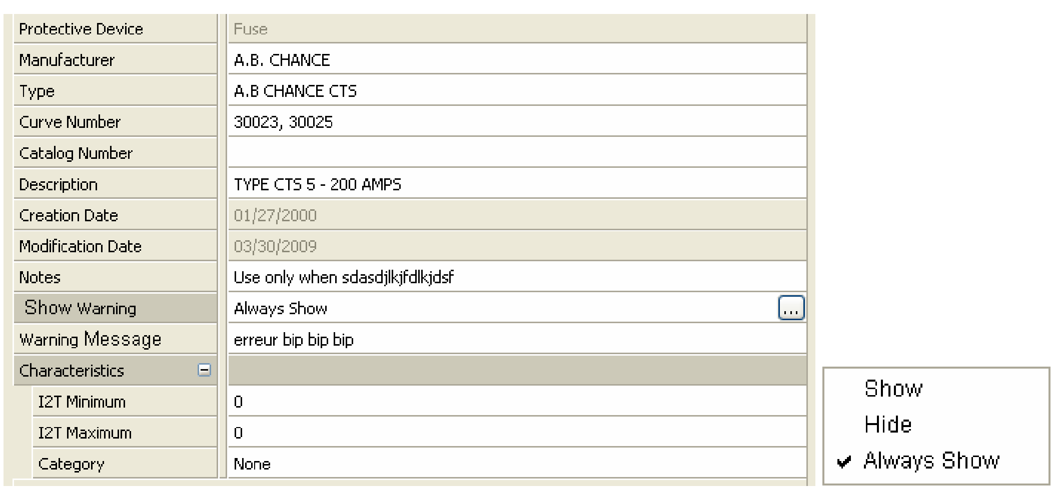
17.5 Warning Message

This option is use to warn a user about the device type he's adding or a device included in the study he's opening. The warning could be that a new type is replacing the one used in the study or an important aspect of the device for example.

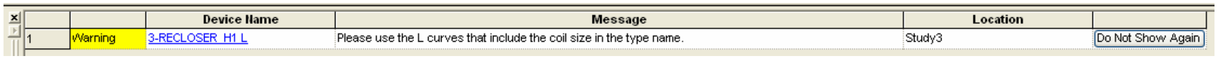
To add a Warning message, use the library editor, under the General tab you will find the Warning Line. Click on it and click the … button. An Edit dialog box will open; just write your message into it.

Also, notice that there is a **Show warning** selection drop down box. Three choices are available. Show, Hide and Always Show.

- **Show**: When the warning is shown, the user will have the possibility to click the **Do not show again** button changing the selection to Hide
- **Hide**: The message will not appear.
- **Always Show**: Similar to **Show** but the **Do not show again** button will not be available.



When the user open an existing study containing a device type with a warning or creates a new device containing a warning, a message box docked at the bottom of the screen will open. It contains the warning message, the device name and the study name it's associated with. If the D**o Not Show Again button** is clicked, it will activate the Hide warning option of the library editor, as shown above, and for as long as the hide warning is checked, the warning message will never be displayed.

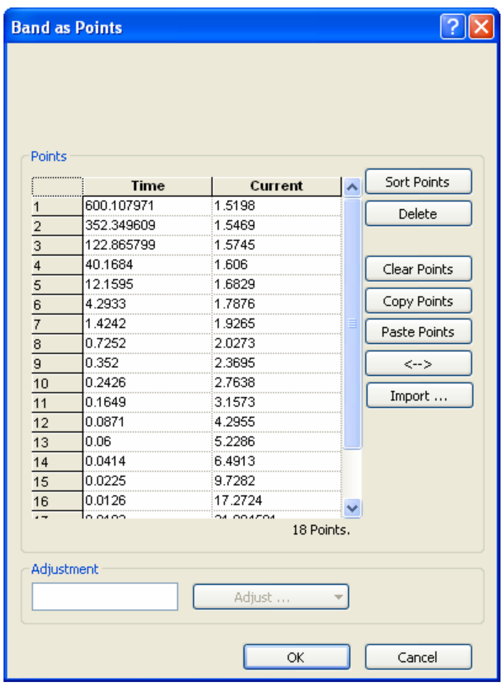


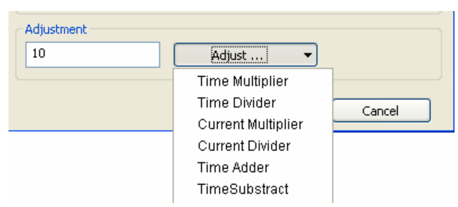
17.6 Time/Current Points Editor (Model as Points)

This option allows you to enter the time/current points that will compose a curve.

The top portion of this dialog box is sometimes showing a combo box listing different curves available.

To insert Time/Current points, scroll down to the bottom of the list, an empty line is available. As you enter your values, a new empty line will be added.



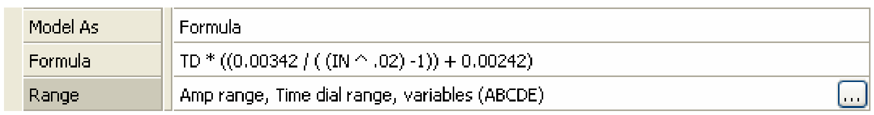


Sort Points	If you've entered a time/current point and would like it to be inserted at its right position in the list (Time Descending), click this button. **Note**: When you click the **OK** button to exit the dialog box, all the points will be sorted.
Delete	To delete the selected line.
Clear Points	To remove all the points.

Copy Points	To copy all the points to the clipboard. They can be then copied to an Excel or a text file.
Paste Points	Paste points that are in the clipboard. It can be points taken for Excel for example.
< -- >	Switch the Time and points columns. Useful if you have pasted points that were copied from a Current/Time format.
Import	Add points from a tab- or comma-delimited text file.
Adjustment	Allows you to modify the Time or the Current column by a factor.

17.7 Model as Formula

Indicates the mathematical formula defining the Curve.

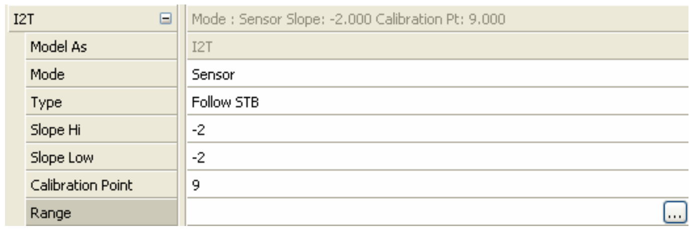


Model As	The type of curve used for the selected curve. (Points, Formula or I2T) **<u>Note</u>**: The choices available for selection depend on the device type. Some device curve types cannot be changed.
Formula	Is the mathematical expression defining the time-current curve. It calculates the time coordinate from the current. Type it in, using the functions listed below. Example of a relay formula: 80∗TD / ((IN^2) -1) **Reserved key words**: TD: time dial. IN : current in per-unit of pick-up. A,B,C,D,E: Extra variables. **Available operators**: **+** Addition – Subtraction **/** Division **^** Exponentiation **∗** Multiplication ( ) operation grouping ABS(x) Absolute value of x. ACOS(x) Arc-cosine (radian) ASIN(x) Arc-sine (radian) ATAN(x) Arc-tangent (radian) COS(x) Cosine (radian) COSH(x) Hyperbolic cosine

	EXP(x) Exponential function e^x. LOG(x) Natural logarithm, ln (x) = $\log_e(x)$ LOG10(x) Logarithm to base 10, $\log_{10}(x)$ POW10(x) 10^x ROUND(x) Round x to the nearest integer SIN(x) Sine (x in radians) SINH(x) Hyperbolic sine SQR(x) Square, x^2 SQRT(x) Square root, $\sqrt{x}$ TAN(x) Tangent (x in radians) TANH(x) Hyperbolic tangent TRUNC(x) Integer part of x
Range	Click the **…** button display the **Range Editor** dialog box and enter the range. (see 17.9)
Amp range	Defines the validity range of the relay and the precision with which the curve is drawn. If the curve does not begin until current (IN in the **Formula**, above) reaches 1.01 p.u., set **Min Value** = 1.01. Similarly, **Max Value** defines the end-point of the curve. **Increment** defines the current at some intermediate point.
Time Dial range	Defines the possible values of the time dial (TD in the **Formula**, above). Give the minimum and maximum values and the step size between values. CYMTCC will list all the intermediate values in the Relay dialog box.
A,B,C,D,E	Are extra variables that can have there own range (Min, Max and Increment). You can also specify a name for the variable. This name will be used in the **Device Properties** dialog box under the Param option. **Note**: Those variables are mostly used for user defined curves available in some devices.

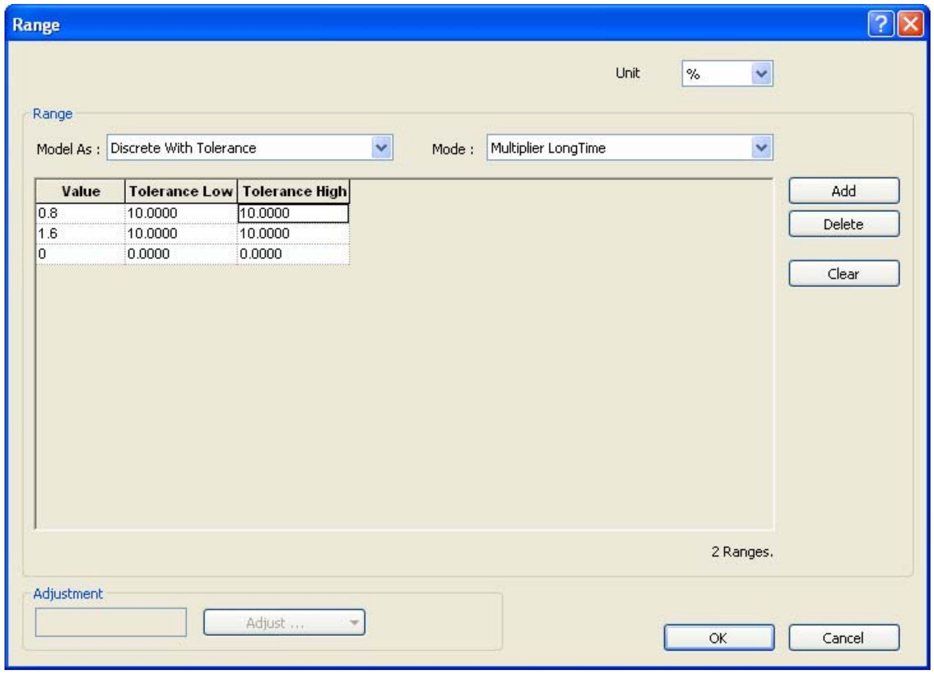
17.8 Model as I2T

A curve modeled as I2T is created from a calibration point and a slope. Basically, it is a straight line that has a slope of the value entered in the slope field and crosses a point (Amp, Time). The Ampere value is the calibration point and the Time value is defined in the **Range Editor**. (see 17.9)



Model As	The type of curve of the selected curve. (Points, Formula or I2T) **<u>Note</u>**: The selection choice depends on the device type. Some device curve type can not be changed.
Mode	Offers a choice among up to four ways of defining the Long Time Pick-up current. **<u>Note</u>**: This field may or may not be available for all the device types. Also, the selection choices may not include all the following. **Sensor**: LTPU = Sensor ∗ Long Time Multiplier **Current Setting**: LTPU = Sensor ∗ Current Setting Multiplier **Actual Pick-up:** LTPU = Sensor ∗ Current Setting Multiplier ∗ Long Time Multiplier **None:** XXX XXXXXXXXXX
Slope Hi	Is normally equal to -2. You may calculate the slope using two points (I1, T1) and (I2, T2) on the curve, as follows: slope = [log(T1) - log(T2)] / [log (I1) - log (I2)]
Slope Low	No longer used.
Calibration Points	Is that multiple of Long Time Pick-up current at which the time value of each delay band applies exactly.
Range	Click the **…** button to enter the band values and the minimum and maximum tolerance. You can choose to model the band as continuous or discrete.

17.9 Range Editor

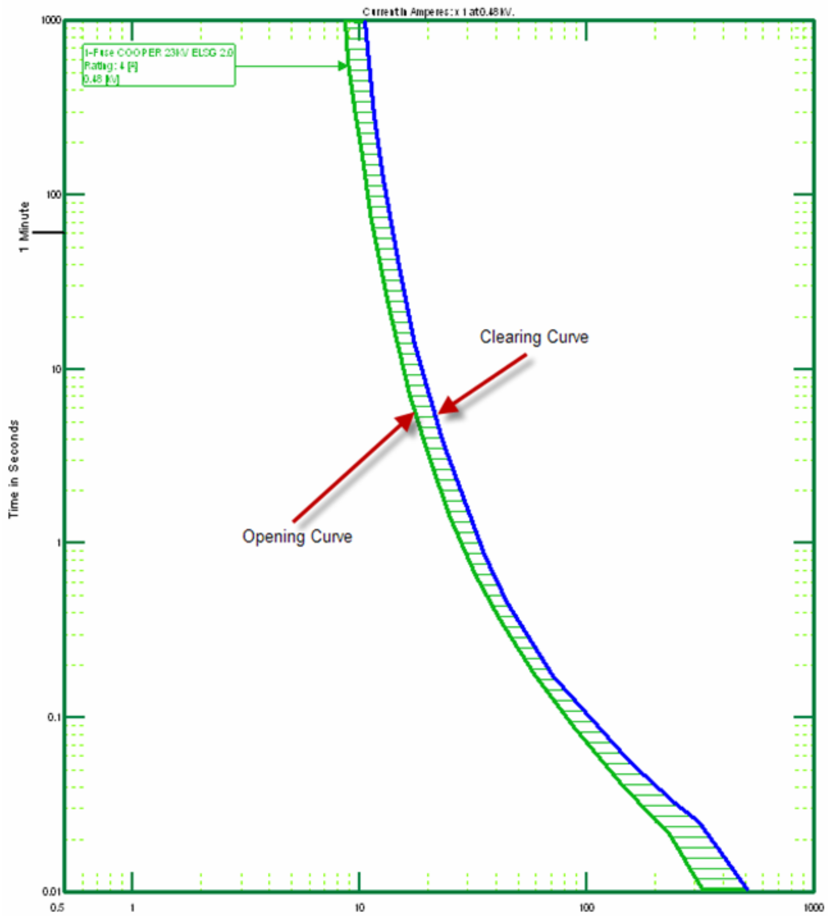


The options listed below may or may not be available when you use the **Range** dialog box. Those depend on the option that was selected in the **Library Manager**. Only the required fields for that particular option will be available. Furthermore, the contents of the dropdown list and the table where the values can be entered also depend on that same option.

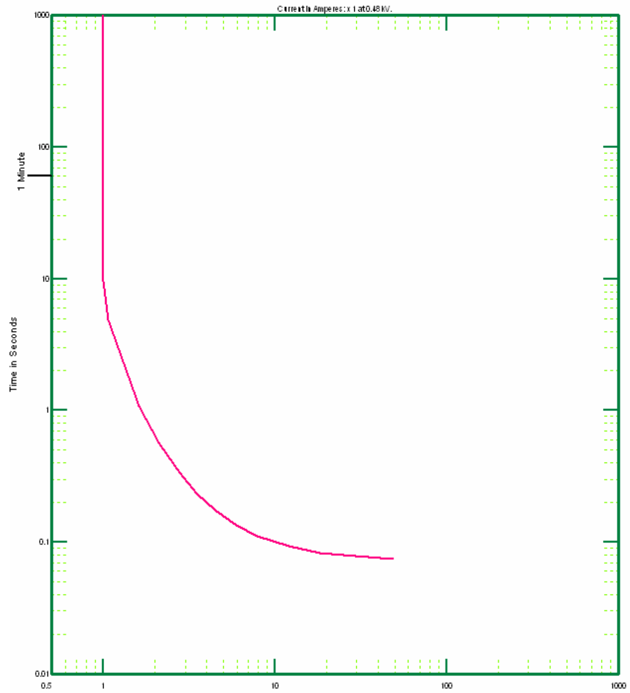
Unit	Select between Percent and Seconds.
Model As	The range can be defined as Continuous (Min, Max, Step) or Defined (i.e.: 1, 2, n). The With tolerance option is to indicate that a tolerance is required for the value(s)
Mode	Switch between the different modes of the option that was selected in the **Library Manager** main window.
Table	This is the box were the required values will be entered. Usually, divided in columns.
Add	To add a new line to the table.
Delete	To delete the selected line from the table.
Clear	To remove all the lines from the table.
Adjustment	Allows you to modify the Time or the Current columns by a factor.

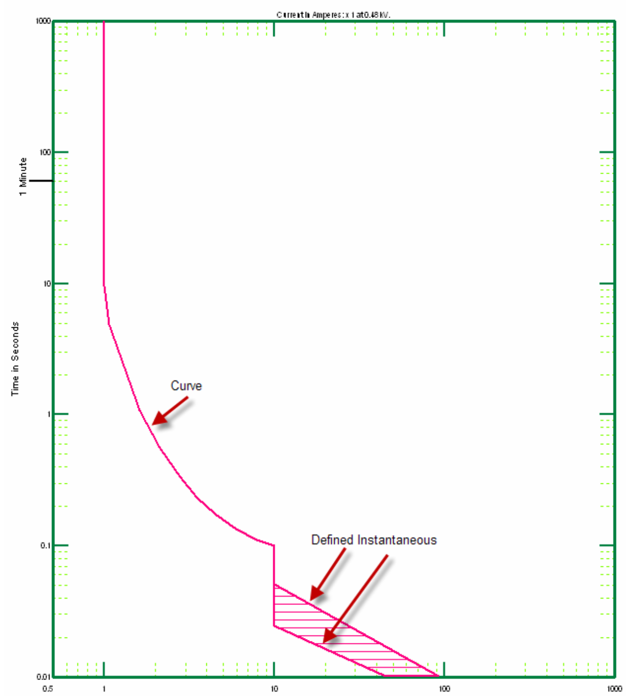
17.10 Curve Examples

17.10.1 Fuse



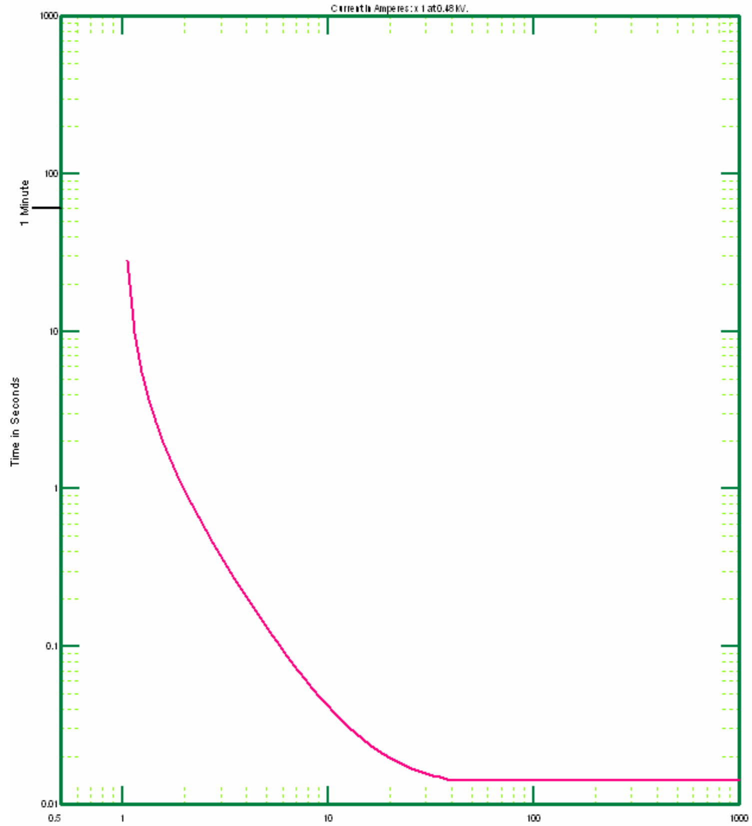
17.10.2 Relay Electromechanical



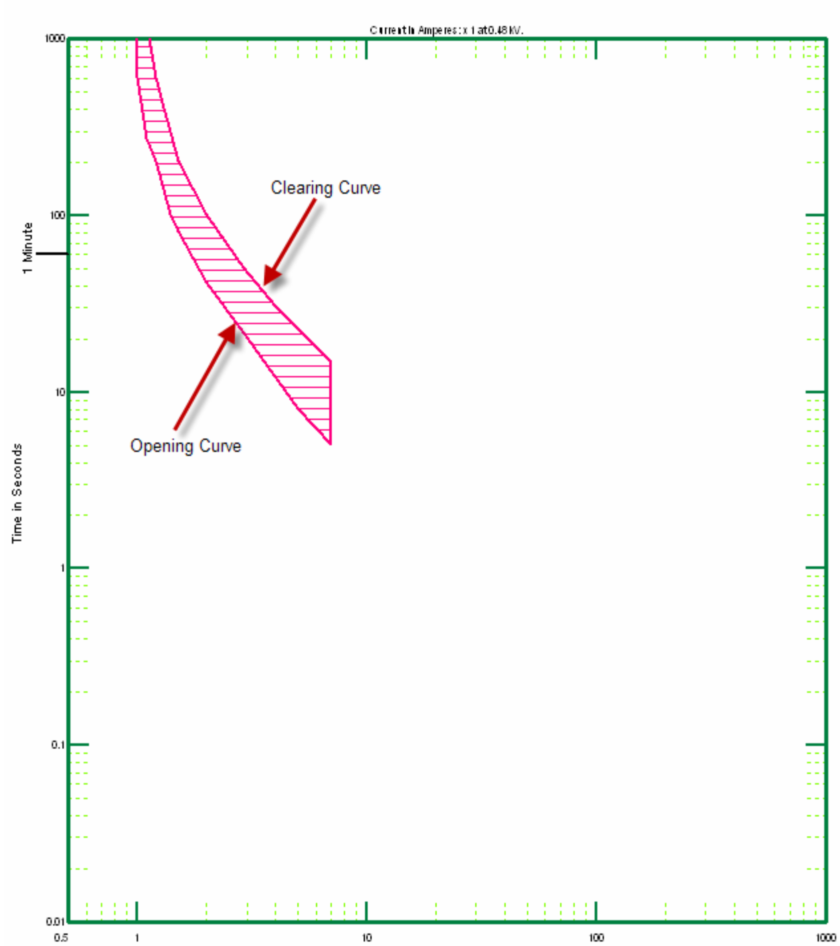


Relay with defined instantaneous points and the instantaneous option selected on the device.

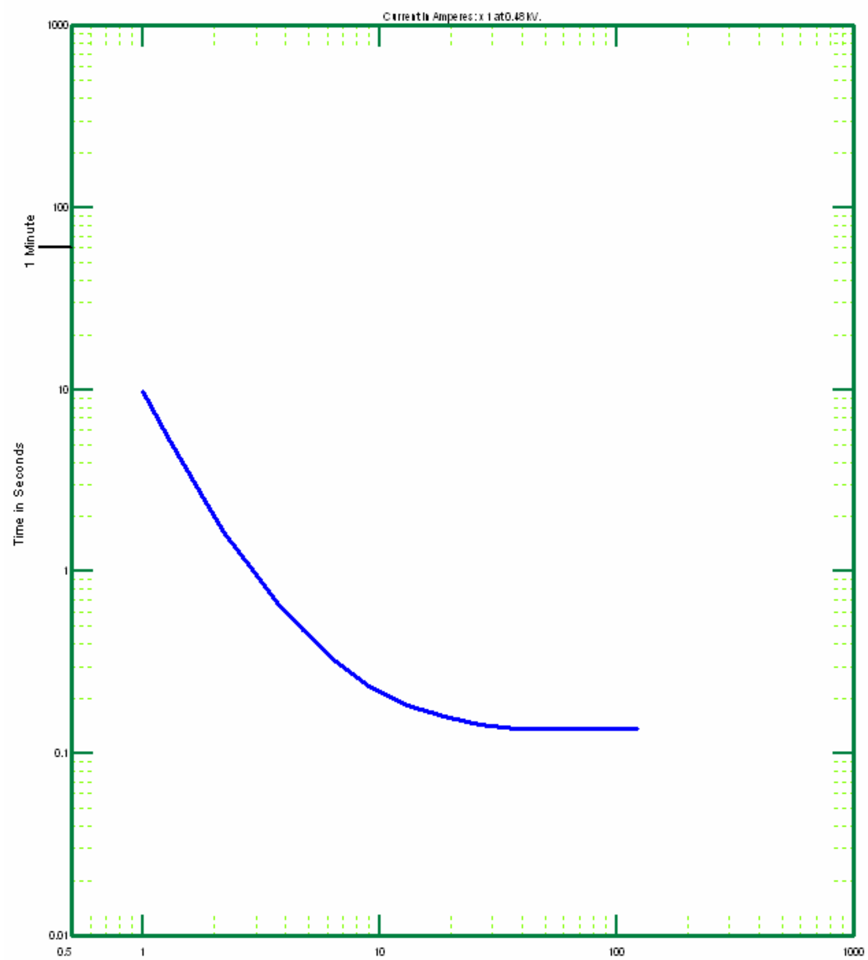
17.10.3 Relay Electronic



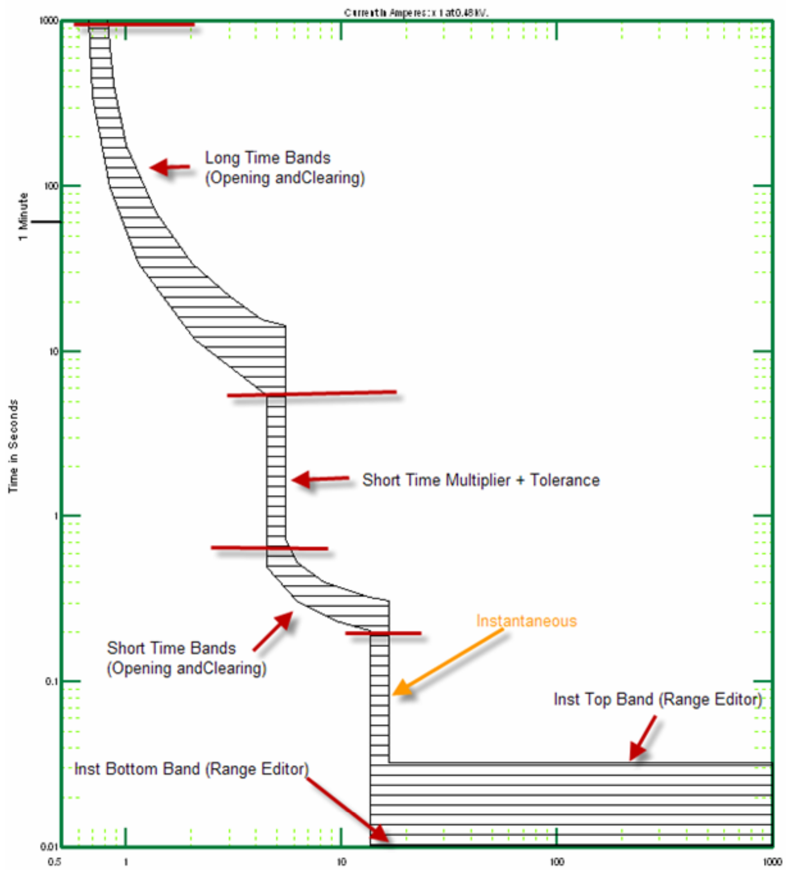
17.10.4 Motor Relay



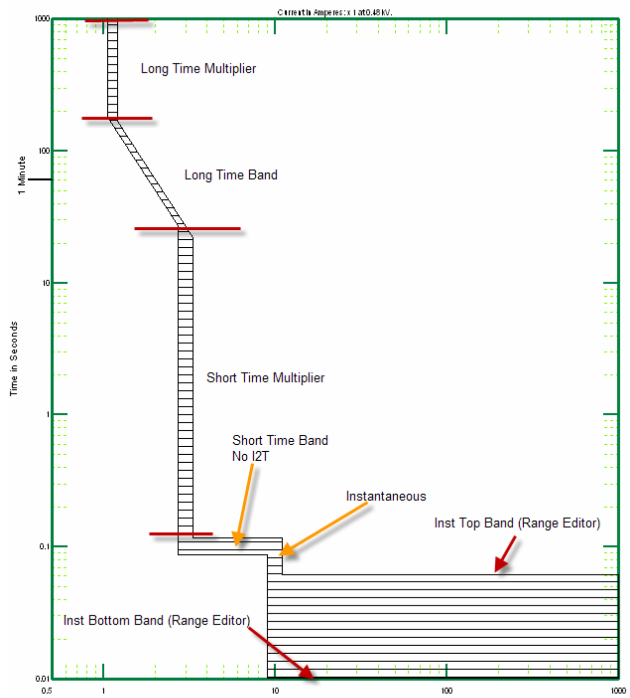
17.10.5 Reclosers

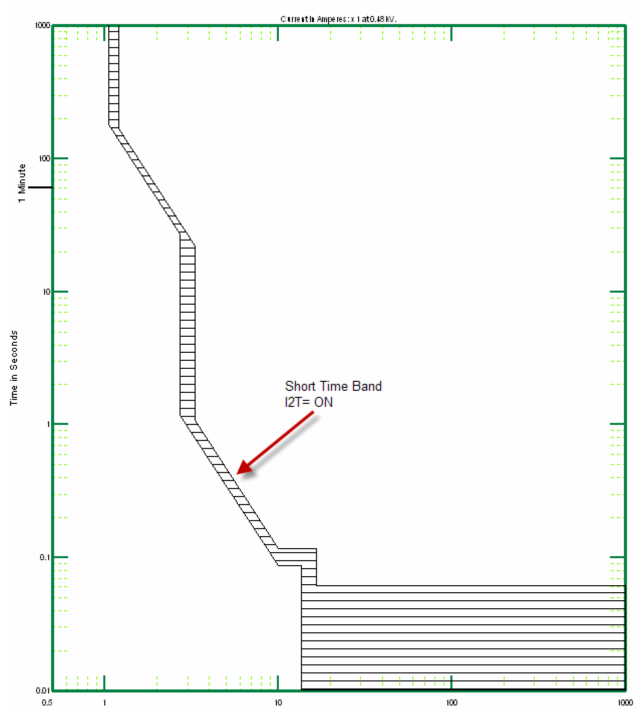


17.10.6 LVCB Electromechanical

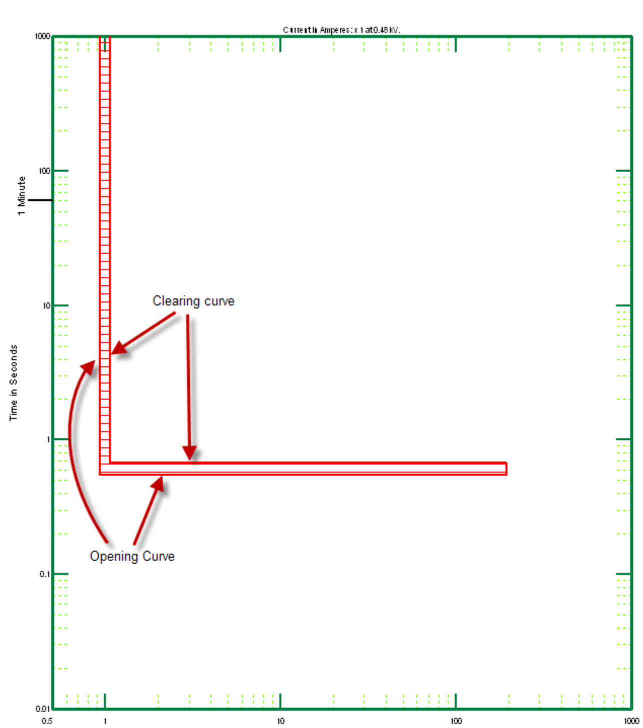


17.10.7 LVCB Static

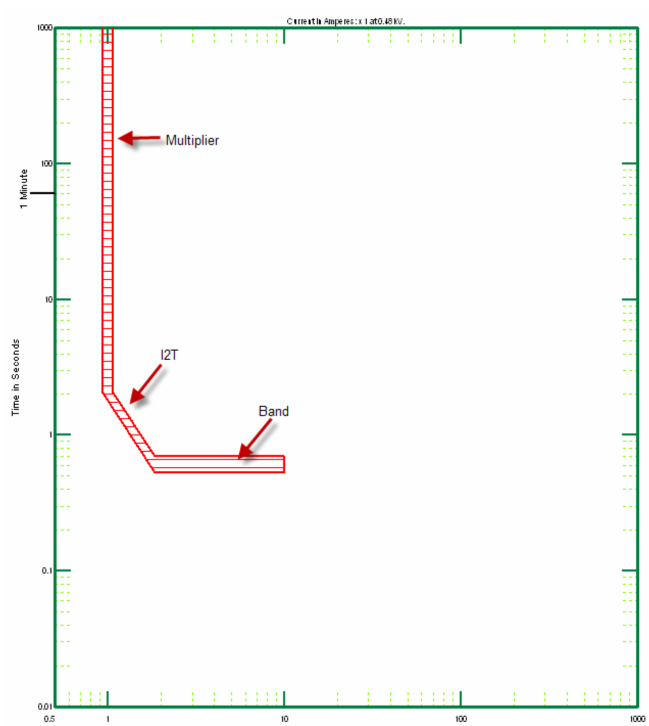




17.10.8 LCVB Ground Fault

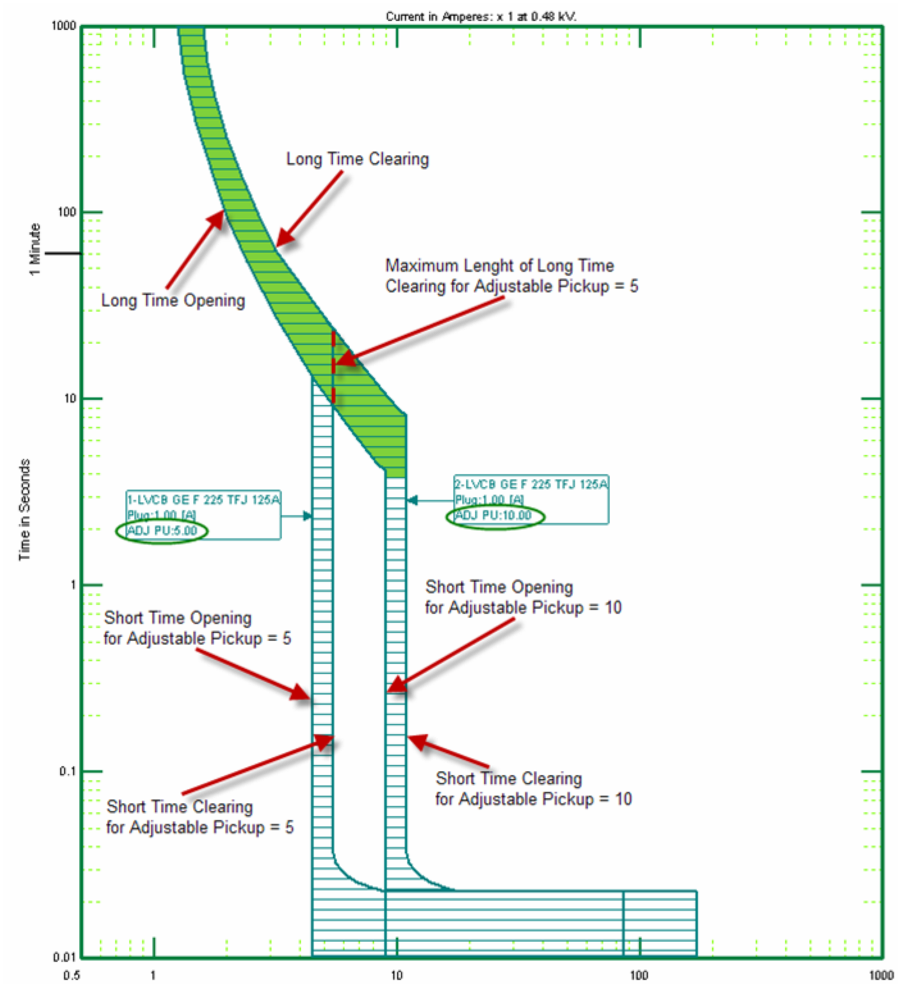


Curves Modeled As: Points

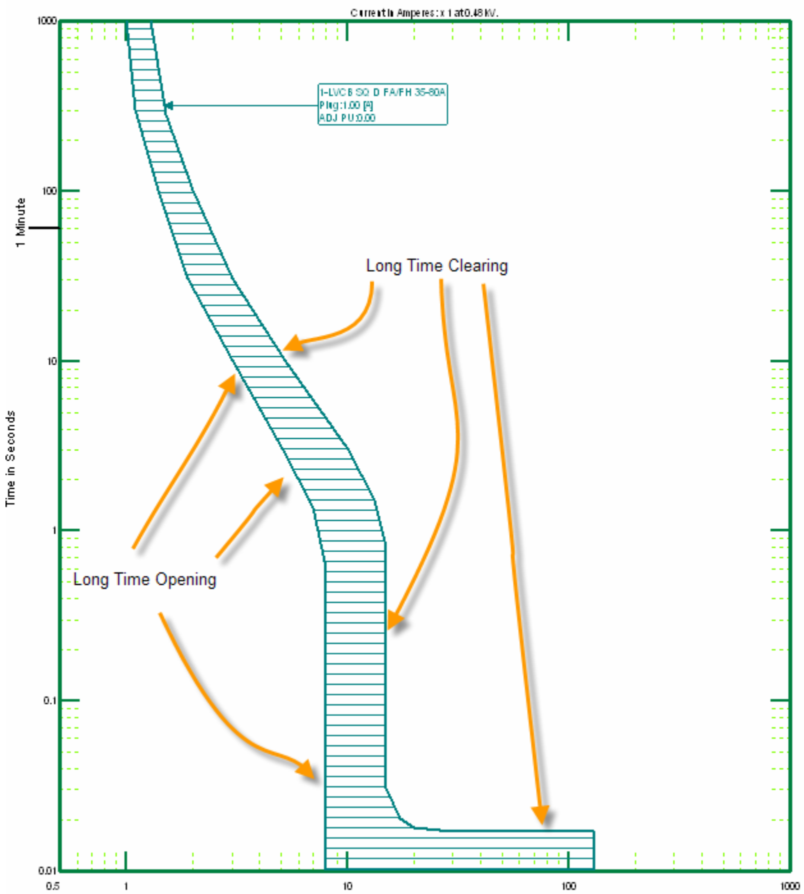


Curves Modeled As: I2T

17.10.9 LVCB Molded

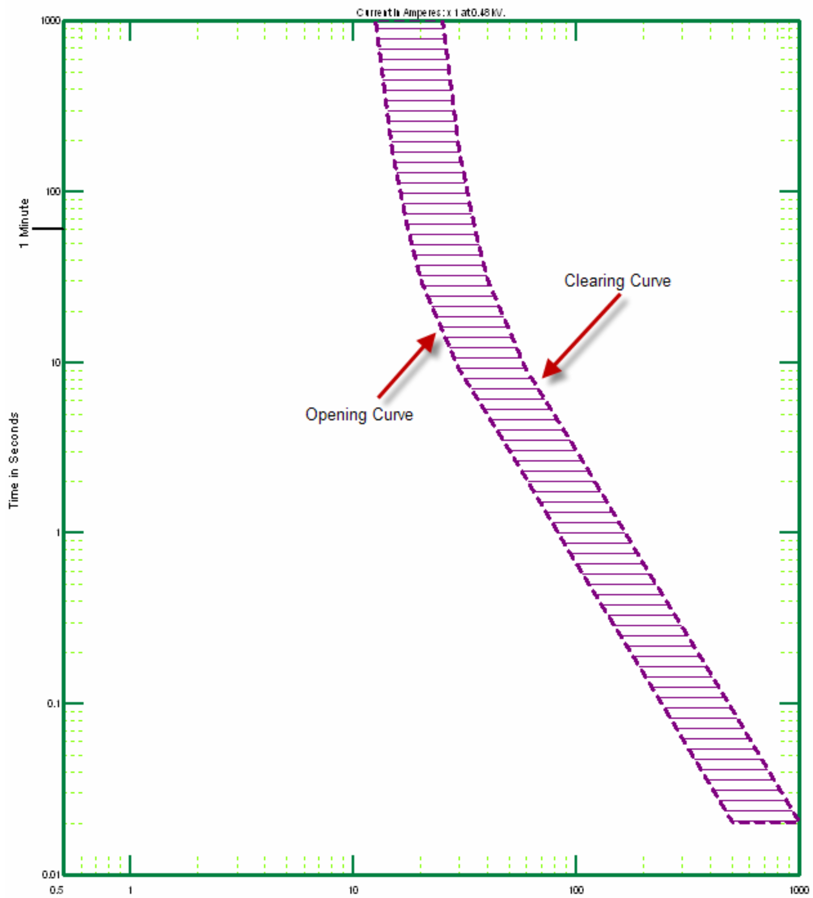


The image above shows two curves of the same type, but with two different pickup Adjustments. The two long time curves are overlapping up to the dotted line identified as maximum length of long time curves for adjustable pickup = 5. The bottom portion of the curves, the short Time curves, shows two pickup adjustments 5 and 10.



The curve above shows one device type using only the Long Time opening and clearing curves.

17.10.10 Miscellaneous



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